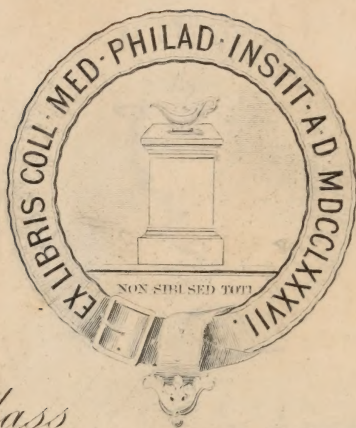




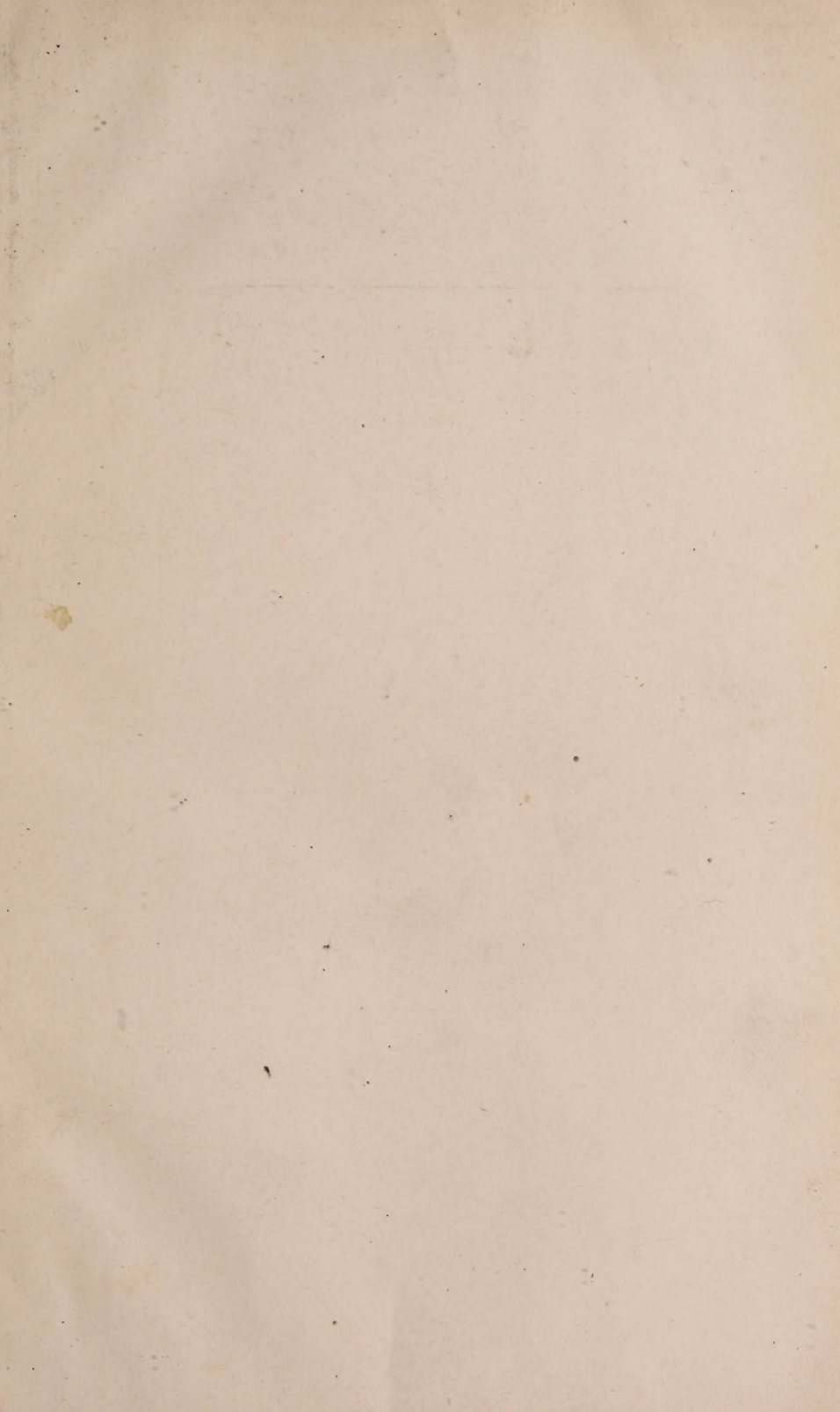
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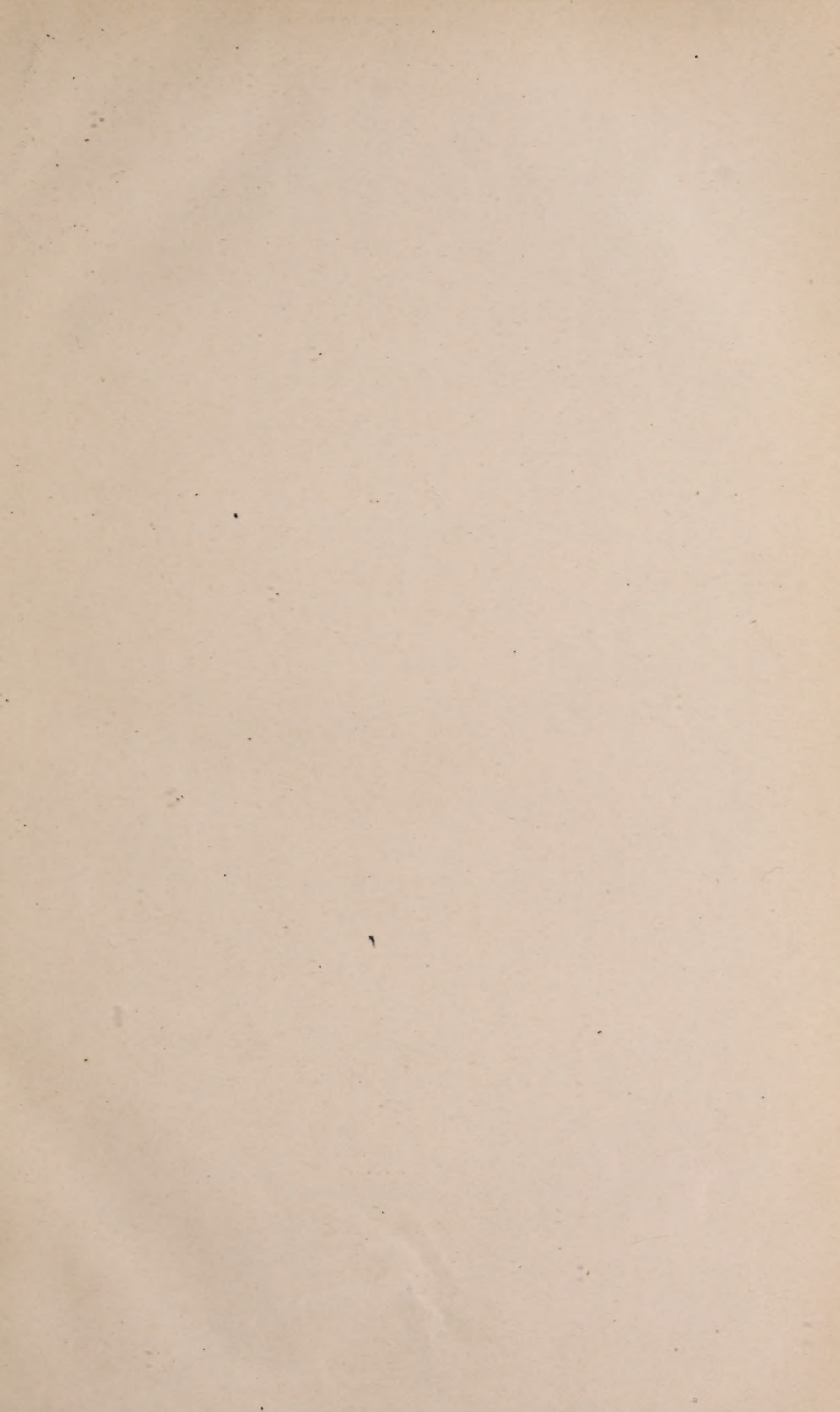


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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

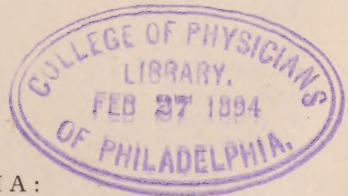
Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S.

Observe, Compare, Reflect, Record.

VOL. XXXV.



PHILADELPHIA:

THE S. S. WHITE DENTAL MANUFACTURING CO.,

CHESTNUT STREET, CORNER OF TWELFTH.


1893.

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TO THE PRESENT TIME
BY
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THE
DENTAL COSMOS.

VOL. XXXV.

PHILADELPHIA, JANUARY, 1893.

No. 1.

ORIGINAL COMMUNICATIONS.

ASEPSIS AND ANTISEPSIS IN PRACTICE.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

IN the DENTAL COSMOS for 1891, p. 514 *et seq.*, I published the results of experiments on the sterilization of dental and surgical instruments, which showed that the methods commonly in use are totally inadequate to the purpose. Since that time I have been occasionally asked whether I carry out in practice the measures recommended in the article referred to, and if it does not entail a great sacrifice in time and labor to do so.

It is the object of this communication to show that the methods suggested may be carried out in daily practice with perfect ease. I need not again point out here the desirability—in fact, the necessity—of the strictest aseptic and antiseptic precautions in operations upon the mouth. There may still be dental surgeons who know little and care less about asepsis and antiseptis, and who maintain that they can do just as good work with soiled hands and instruments as with clean ones; the public, however, is becoming too well enlightened on this point to tolerate them.

THE CLEANSING OF THE HANDS.

It is well known to be an exceedingly difficult matter to completely free the hands from living bacteria. Fürbringer's method,* which places particular stress upon the sterilization of the subungual space, requires: (1) Dry cleansing of the nails from visible dirt; (2) brushing the hands, particularly the nails, for one minute with soap and warm water; (3) washing for one minute in alcohol, not under eighty per cent.; (4) thoroughly brushing for one minute in a 0.2 per cent. solution of sublimate, or three per cent. solution of carbolic acid. This operation requires about ten minutes, unless everything is placed in readiness by an assistant; in this case it may be gone through with

*Fürbringer, P., "Untersuchungen und Varschriften über die Desinfection der Hände des Arztes, nebst Bemerkungen über den bacteriologischen Character des Nagelschmutzes." Wiesbaden, 1888, Bergmann.

in somewhat less time. Kelly* scrubs the hands and forearms with sterile brushes for ten minutes with olein (common brown kitchen soap) and hot water, the nails with especial care. They are then immersed in a saturated solution of permanganate of potash, and transferred at once to a hot saturated solution of oxalic acid. Finally the hands are rinsed in sterilized water. This operation requires about fifteen minutes.

The question has been asked, whether absolute sterility of the hands is necessary on the part of the dentist. It is reasoned that inasmuch as the human mouth, even when well cared for, contains enormous numbers of micro-organisms, the introduction of a comparatively insignificant number on the fingers would probably result in no difference whatever in the general condition of the mouth. Furthermore, the fingers of the dentist do not come into contact with tissues which are very susceptible to infectious agents; consequently hands that would be fatal to the success of a surgical operation may be introduced into the mouth without any ill results whatever. These conclusions should be accepted only with considerable restrictions, and only with the understanding that the hands do not carry any specific germs, and do not introduce into the mouth any pathogenic micro-organisms not already there.

I have adopted in practice the following mode of procedure:

Before beginning my work in the morning I cleanse my nails, which are not allowed to become over a mm. long, with a penknife, and then brush the hands, giving, of course, particular attention to the nails, for two minutes with a rather stiff brush, in a warm one to two per cent. solution of lysol. Lysol is quite equal, if not slightly superior, to carbolic acid as an antiseptic, and is far less escharotic. It makes a soapy solution, and cleanses the hands beautifully even without soap, though I usually add soap as a matter of habit as well as to make the cleansing doubly sure. The hands are then rinsed in hydrant water and thoroughly dried. The whole operation requires about four minutes. The hands are perfectly clean, but of course not absolutely free from germs. If the fingers are rough or cracked, or the nails long, double the time will be requisite to accomplish the same end. A slight odor of lysol clings to the fingers, but I have not found it disagreeable to the patients; on the contrary, they are glad to be reminded of the fact that the dentist takes proper care of his hands.

Between operations or consultations I wash the hands in soap-water, brushing the nails and fingers for half a minute to a minute.

If, however, I have performed an operation upon a filthy mouth, I return to the lysol solution, even increasing its strength according to indication to two and one-half, three, and even four per cent.

I do not knowingly, under any consideration, take on syphilitic patients during my regular hours of practice. If I am obliged to operate for such a patient I give an appointment at the close of the day, when there is ample time to disinfect hands, instruments, etc. If, however, the discovery is not made until the operation is begun, then it is as well to finish it at once; but in this case an *absolute* sterilization of the hands is called for, either by Fürbringer's or Kelly's

* "Gynecological Technique." *The New York Journal of Gynecology and Obstetrics*, July, 1892.

method, except that in the former I should recommend lysol instead of carbolic acid, and treat the hands at each step two minutes instead of one.

It may be remarked in this connection that when the hands have been cleansed they should not be contaminated by contact with infected objects before or during the operation. It is not permissible to handle money or old teeth, or to dive down into the trousers pocket for a jack-knife, nor do I consider it quite proper to hold instruments back of the ear or between the teeth.

STERILIZATION OF INSTRUMENTS.

In regard to instruments, particularly forceps and excavators, I hold that absolute sterilization should be demanded, inasmuch as infectious matter is much more readily communicated by them through wounds than by the fingers, and further because the sterilization is so easily accomplished that there is no excuse whatever for our neglecting it.

The method of sterilizing instruments now most commonly in use is by means of boiling water containing one to two per cent. of carbonate of soda to prevent rusting. Three minutes for excavators and five for forceps will be sufficient, unless the instruments are covered with a thick, dry coat of infectious matter,—a condition of things not supposed to exist nowadays in a dental instrumentarium.

Various apparatus have been devised for carrying out the boiling process, some of them, I think, unnecessarily complicated. I have devised a very simple boiling-pan, consisting of a metallic box three inches wide, six inches long, and one and one-quarter inches deep, with a partition wall in the middle parallel to its length, and a rim at the top one and one-half inches wide, making an angle of about one hundred and thirty degrees with the side of the vessel. In this apparatus the hot water does not come into contact with the handles of the instruments, which in many cases would be injured thereby. Fine-edged surgical instruments are said to suffer in the course of time from boiling (become blunt), but this objection can hardly apply to dental instruments. Personally, I have adopted another method of sterilizing instruments. My chief reason is the fact that even a very little boiling in a dental office is sufficient, in summer, to perceptibly raise the temperature of the room, and I have no room adjoining where the boiling might be done. I have found that a four to five per cent. solution of carbolic acid, lysol, or trichlorophenol suffices to completely sterilize mechanically clean instruments in thirty minutes.

I keep two complete sets of instruments constantly in use, and as soon as I have finished operating for one patient the whole set of instruments used is removed from the operating-table and placed in the antiseptic solution, where it is allowed to remain while the other set is in use, or at least half an hour.

I do not only consider it necessary that every patient should have a fresh set of perfectly sterilized instruments, so that germs of disease may in no case be communicated from one person to another, but I hold that while operating for any one patient the instruments should be kept in a clean if not sterile condition. I should, for example, consider it dangerous to wound the mucous membrane with an instrument just employed on infected tissue; consequently instruments which

become strongly infected (burs used in opening up putrid pulp-chambers, etc.) should at once be dropped into the antiseptic, and all instruments which become soiled with blood or mucus should be thoroughly cleansed before being used again, even for the same patient. All this is done by the office-girl, who is indispensable for keeping the instruments in a proper condition.

For about a year and a half I used a four to five per cent. solution of carbolic acid, to which one-half to three-quarter per cent. of carbonate of soda was added to avoid rusting. I designate this small quantity because it is just sufficient, and a larger per cent. I have found by experiment to lower the antiseptic power of the carbolic acid.

Since about four weeks I have substituted lysol for carbolic acid, since it is not necessary to add the soda to prevent rusting. It is also cheaper than carbolic acid. All instruments, including, of course, corundum disks, files, and clamps, are subjected to this treatment, whereas those instruments which do not come into contact with the mucous membrane, or do not become soiled in the mouth (gold-pluggers, etc.), are only occasionally sterilized.

Mouth-mirrors require extra care, and must be carefully brushed before treating with the lysol solution, in order to remove small particles of infectious matter which may have inserted themselves between the glass and the fastening. I keep so many mirrors on hand that I do not require to use any one twice on the same day. There is consequently no time lost between patients in cleansing mirrors.

DRINKING-GLASSES.

In order to be able to place before every patient a glass which at least does not carry any germs from the mouth of a previous patient, I have provided as many glasses as I have patients in a day. These are all placed in a three per cent. solution of lysol in the evening, and remain there for over twelve hours. They are then thoroughly rinsed in hydrant water.

I never use a piece of rubber-dam more than once under any circumstances. If I were to use the same piece repeatedly, I would sterilize it by boiling for ten minutes in the soda solution.

In regard to the sterilization of napkins, teeth for transplantation and implantation, etc., I have nothing to add to what I have already said in the article before referred to.

RELATION OF THE FOOD TO THE TEETH OF THE PAST AND PRESENT RACES OF THE HAWAIIAN PEOPLE.

BY J. M. WHITNEY, M.D., D.D.S., HONOLULU.

(Read in absentia before the annual session of the California State Dental Association, July 19, 1892.)

PROBABLY no one theme in our specialty has been more frequently written upon and discussed in our societies than the relation existing between the food and the condition of the teeth of the present and past generations of mankind. We have carefully traced our ancestors back to their rude homes and ruder life, and when we have found an improved dental organism some among us have said that for

various reasons these early races were less contaminated by the streams of heredity than we ; others, that there was a better adaptation of the food to the needs of the man ; while others have seen with equal clearness that any food, accompanied with the hardships and exposures which befell them, would build up strong muscular bodies, and these would naturally be accompanied with well-developed teeth. Others, discarding food as the principal agent, believe that the true source of advancement in the dental conditions must be looked for from the minerals taken into the system through the water we drink, and say, We need but more lime in our bodies, and the principal source of our troubles in this direction will be over. Still others see that our food needs but better appropriation and assimilation, and our usual food would supply ample lime for all our requirements. Thus the war of words and ideas goes on, and we seem to be no nearer the solution of the problem than we were years ago.

The peculiarly limited and isolated condition, both in the past and present, of the Hawaiian people, together with the ease with which their former dental state may be studied, owing to their peculiar customs of burial, have led me to think that perhaps a little side-light might be thrown upon the question through some observations I have been able to make during my long residence in these islands and familiarity with this people.

Though I may not claim to enter the arena of discussion, I hope to be able to show that here at least the food, the mode of its preparation, and its quality and kind have more to do with the problem of dental caries than any question of physical development, of manner of life, or of the minerals that might be taken into the body through the drinking-water.

The Hawaiian Islands, thirteen in number, occupy a unique position in the world, being comparatively mere specks in the great Pacific Ocean, and more than two thousand miles from any other land in any direction. They are volcanic in formation, and almost entirely surrounded with coral reefs. The origin of the inhabitants is buried in the obscurity of unrecorded antiquity ; but from the discovery of human bones in coral rock and under lava beds it has been estimated that these islands were inhabited as early as A.D. 500. Reliable tradition, however, extends back many hundreds of years, and long before Europeans set foot upon American soil it is known that these fertile islands were closely inhabited, and frequently devastated by cruel and degrading wars.

In general, the formation of these islands may be compared to that of a bell with a very broad flare at the base. Lofty mountains rise with great irregularity in the center, leaving a more or less extensive strip of fertile soil between them and the sea-shore. These mountains, being volcanic, are thrown in every possible shape, many of them being piled in almost or quite perpendicular precipices or palisades. These are almost invariably honeycombed with caves of all sizes and depths, from that of a few feet to miles in extent. In many places, especially upon the island of Hawaii, the openings of these caves are on the faces of perpendicular palisades hundreds of feet in height. In these often apparently inaccessible retreats the old Hawaiians loved to deposit the bodies of their dead, especially their chiefs, for whose reception those the most difficult to reach were chosen, that

they might be the more secure from molestation. There they are still, doubtless, reposing in many places where the less adventurous natives of the present time can never reach them.

But, fortunately for our purpose, these burial-caves are not all inaccessible, and I have myself been able to investigate many of them, and gather what lesson I could from the ancient bones remaining there. As you may well believe, it is not a pleasant, though it may be an interesting, task to visit these dark tombs. By the light of a torch or lantern you grope your way among the cinders and dust of the caves, whose sights and odors are not at all agreeable. Though formed naturally by the lava streams, many of them have various side-chambers and branches extending more and more into the sides of the cliff. In the farthest end lie all that remains of the old Hawaiian chiefs. Wrapped first in the native cloth or tapa, a favorite coffin was an old canoe. Sometimes a huge gourd was large enough to hold the body of a child. They are frequently found, if undisturbed, in the position in which their dead are usually interred, with their knees drawn up to the chin, and the arms bound over the legs in an uncomfortable sitting posture. In some cases the dry air has prevented decomposition, and the bodies are found in a half-mummified condition; but generally all that remains are the bones and skulls lying about in unmated confusion. Their friends are not there to claim them, for they too were ages ago laid away. So, not irreverently, but in the interest of science and humanity, we gather the scattered bones, and once more bring out these old Hawaiian chiefs to the light of day.

We find them to have been of larger stature than we see the race to-day. The bones are large and strong, the points of attachment of the muscles are greatly developed, showing that they must have had powerful muscles, especially about the head and lower jaw. The skull is thick, large, and round, often with receding forehead. The Hawaiians never bound the head, as is the custom of some of the Indian tribes; but during the first year of the child's life the mother or nurse almost constantly worked with the back of the head so as to flatten the base of it and make it rise in a sharp ridge above.

The jaws, set with regular, massive teeth, strike with the normal articulation, or squarely upon each other, so that the countenance must have had an intelligent, firm, and decided aspect. The teeth were large, well formed, with heavy enamel; those of older people usually much worn by the hard, coarse substances they were accustomed to eat. Dental caries is occasionally seen; irregularity or absence of the third molar is more frequently to be noticed. But as a whole the ancient people whose bones are found in the caves must have been comparatively free from much of the dental trouble that has come to their descendants.

But the lava caves are not the only burial-places, for, as might be supposed, they would after a time prove inadequate to receive the bodies of the hundreds of thousands with which these islands were then teeming. So, naturally, the light sand of the sea-shore was then chosen, where, with their rude implements of shells, perhaps, it was easy to scoop out a place to lay their dead. Special localities seem to have been selected, in open places where the trade winds piled up the sand many feet above the beach, and where with effort the skele-

tons may still be found. Twenty years ago there were several such burial-places within easy access from Honolulu, where for miles on the shore the bleached bones and skulls lay exposed for any one to gather, and a little searching in the sand would reveal whole skeletons sitting in Hawaiian fashion with their hollow eyes facing the sea. These bodies were so numerous in places now almost uninhabited as to suggest the theory, which many hold, that they were not burying-places, but battle-fields where the fallen were left to lie till the shifting sands had covered them. But the facts that the skeletons were almost always found in this sitting posture, and that there were found there the bones of women and children as well as men, convinced me that these were really Hawaiian burying-places of ages ago, when these hills and shores were literally swarming with a rude but prolific race. The increased cultivation of the lands and the inundation of curiosity-hunters have within a few years obliterated these interesting places, and now I know of but one spot, and that upon a distant island, which from its difficulty of access is rarely visited by the curiosity-hunters, where one may find such an old burial-ground.

I have examined carefully these bones found in the sand, many of which are polished and white as ivory, and have not been able to discover any marked difference in the general appearance of the skeletons. While the bony structure is strong and well developed, I have thought they were less uniformly large and massive. The crania are often thinner, having not infrequently the appearance of belonging to a European rather than a savage; many of them are lacking one or both the superior or inferior incisors, while the rest of the teeth may be comparatively perfect. This is doubtless due to the heathen custom of knocking out one or more of the front teeth as a sign of mourning at the death of a high chief or king. While sometimes the root would be left in, generally the whole tooth would be gone, and it is peculiar that the teeth on each side never seem to incline toward each other.

In one place I found an interesting study of heredity. Throwing off a slight layer of sand, two skeletons were exposed, evidently those of a mother and daughter. The peculiar irregularity of the teeth of the elder was almost exactly copied in those of the younger. Besides the teeth, there was a similar contour of crania, and other points of resemblance which showed there could not have been a coincidence only.

But while no great difference could be discovered between the bones buried in the caves and those in the sand, a change in the condition of the teeth is more noticeable. I have examined hundreds of specimens, and among them have found several cases of beautifully perfect dental development. But these are rare, and it is evident that for some reason, as the nation progressed, the condition of the dental organs retrograded, and dental suffering must have been more common. The most interesting specimen I have in my possession was found in this sand deposit. An inferior third molar developed downward, so that the whole crown of the tooth either forced its way through the periosteum and outlying cellular tissue and mucous membrane into the mouth, or else remained as a tumor. The tooth is normal in all respects, having a perfect crown and two fully developed roots. In passing downward it came directly across the mylo-

hyoid branch of the fifth pair of nerves. One can easily imagine the neuralgic agony experienced while the nerve was being put to the stretch by the growing tooth.

I have several specimens where salivary calculi and pyorrhea alveolaris must have caused much suffering; one of ankylosis of the jaw; one where disease of the antrum of Highmore was caused by alveolar abscess.

I may state, in passing, to those who advocate the doctrine that we are fast losing our third molar, and that in a few generations it will have almost entirely disappeared, that they will find little support for such a theory from the study of these ancient burial-places, as its absence in these remote savages was as common as it is to-day, and by its irregularity was apparently a source of much of their dental trouble.

This is the record of burial-places of past generations. What do we find of the pathological conditions of the Hawaiians of to-day, in relation to the specialty which we have met to consider? I may say without hesitation that a steady and, in late years, a rapid retrogradation is taking place in the condition of the teeth of these people. I have observed and studied the subject for twenty-three years. Though the race is rapidly passing away, during my early years here there were still left many of the natives whose early life had been passed in civilized times indeed, but before the foreign customs which now envelop them had come to exert so great an influence. I remember them as a simple, cordial, friendly people, without ambitions for dress and food like their foreign neighbors, but content with their grass hut, their comfortable but simple costume, and with *poi* and fish for their main food, as it was that of their ancestors. Their teeth were generally white and firm, and the dentist was seldom called upon to relieve them from dental suffering.

This race of "old natives," as we often call them, has almost passed away in the places with which I am familiar, though doubtless there are some left in the distant mountain valleys, where the perverting influence of foreigners is not often felt. Their children have in a great measure lost their quiet simplicity. They live in wooden houses, wear foreign clothes, and eat foreign food; and, as may be imagined, their general habits of life being much the same, their physiological condition differs little from that of the whites by whom they are surrounded.

To understand these conditions clearly, it may be best to dwell a little upon the peculiarities of their food. I have spoken of *poi* and fish as their chief articles of diet, in their natural state. *Poi* is made from the *taro*, a plant of the *Caladium* family (*Arum esculentum*), the root of which is baked or steamed in the ground. A hole is dug, and is filled with stones heated very hot. Upon these the *taro* is laid, more hot stones are placed on top of them, and the whole is securely covered with banana-leaves, after which water is poured over them, and they are left to steam. When thoroughly cooked, the *taro* root is removed and pounded a long time with a stone mallet upon a flat board, mixing water with it during the process, till the whole mass is like thick paste. After a few days fermentation begins, and when it is sufficiently acid it is ready to eat. *Poi* is a more palatable dish than one would imagine from the description, and the relish for it is not confined to the Hawaiians.

The natural food to be eaten with *poi* is fish, either fresh or dried, and various kinds of shell-fish. The fresh fish are generally eaten raw. Other favorite foods are pork, dogs, and fowls, which they cook by steaming in the ground like the *taro*. Sweet potatoes and yams were common, also prepared in the same way. Their native fruits are bananas, bread-fruit, cocoanuts, *papayas*, *ohias*, etc., while two or three kinds of ferns, sugar-cane, the sweet root of the *ti* (tee), a common plant growing in the woods, and several varieties of sea-moss were less commonly used. Neither fermented nor distilled liquors were used; but in common with all the Pacific islanders, they drank an infusion of the *awa* plant. Its effects are narcotic and stupefying.

In viewing the above list, you will notice that there is no food like our fine flour, which clings to the teeth. Their *poi* does not adhere to the teeth like bread, but leaves them clean. Their raw fish leaves no fiber between the teeth; their shell-fish carry an abundance of lime; their fruits were none of them acid; the sugar-cane is the perfection of a tooth-brush, as is also the coarse, rough covering of the cocoanut which they strip from the shell with their teeth, thus not only cleaning them, but giving them vigorous exercise. From the present scientific outlook, I do not know that we could add another element to the natural diet of these people that would have a tendency to build up stronger dental structures or more perfectly preserve those they have.

Within recent years a great change has come over the habits of diet, as well as other characteristics of this people. While *poi* is still their favorite food and their fish is still often eaten raw, they eat freely also of bread made from fine flour, and crackers, both of which fasten about their teeth and are left to ferment from one time of eating to another, with cooked fish and salt beef, fibers of which their careless habits permit to lie between their teeth and decompose. Their mild, sub-acid fruits are exchanged for the stringy, acid tamarind, the intensely sour Chinese orange or lime, and the half-ripened guava. Fermented and distilled liquors add to these their share of the destructive agencies which break down and demoralize not only the moral but the whole physical well-being, and are a large factor in the rapid degeneracy of the Hawaiian race.

When called upon for professional services for the older native people, I usually found their teeth bright and clean, with gums in good condition, covering the roots to the enamel. As may be supposed, their children's children are very different. Their teeth are often stained and rough, food is found clinging to the roughened surfaces, and at a glance we see that dental caries must be inevitable. And so we find it in all the forms common to an inferior class of teeth fully neglected. In a careful examination made by myself in one of our native public schools, I have found they have no better teeth than the white children of the same age.

As I look over the life-habits and peculiar condition of this people, giving all due allowance to other active agencies, I can see no other factor sufficiently powerful to account for their physical degeneracy in this respect than the decided and radical change in their food, from the harmless *poi* and raw fish and mild fruits, to the present starchy foods, cooked meats, and acid fruits.

DENTAL EDUCATION OF THE PUBLIC THROUGH THE MEDIUM OF THE PRESS.

BY DR. L. M. WARNER, NEW YORK, N. Y.

(Read before the First District Dental Society of the State of New York, November 8, 1892.)

THE limited amount of information among all classes of people concerning the resources of dentistry seems to be regarded by the dental profession as a matter of course, as though the enlightenment of the general public upon the subject was foreign to its interests and not in its line of duty. If all efforts in this direction are always to be confined to the personal instructions of each practitioner among his own following, the usefulness of our calling will never advance in ratio with its scientific achievements.

Does the profession realize its responsibility as being the authority upon the subject when it allows dentistry to remain one of the most obscure subjects in the current literature of our time?

Its own exclusive literature is technical and scientific, and does not affect the people.

Should not dentistry take as prominent a place in the general reading of the day as its importance demands? Should it not be popularized as well as the other arts and sciences that interested readers are constantly obtaining fresh information about in the magazines and periodicals and in the daily press?

If the medical societies recognize the power of the press as an educational factor and utilize its literary columns for instructive purposes, can the dental societies afford to ignore such a powerful means of education while complaining of the ignorance of the masses?

The press is a most effectual educator upon any subject, for the reason that it is constantly before the eye; it claims the attention in such a manner that knowledge is absorbed intuitively, a little at a time, as the mind can digest it.

Dental books for lay readers will seldom be opened, and it is doubtful if free lectures would be patronized; the attention of the people must be attracted in some more inviting form; tact could be displayed in the treatment of the subject that would make the reading interesting if properly brought to notice.

As long as there is no concerted effort in this respect, quacks will continue to thrive; rubber plates and cheap fees will control the public mind; and teeth will be extracted by the million that should be saved by reputable dentists. The present tendency of the people to flock to places where extraction is the rule makes it easier for those about entering the profession to run a slaughter-house business, thereby degrading the profession, instead of conducting a reputable practice.

Is it not time that every dental society had its educational committee, who should furnish the press with material intended to interest the thousands who suffer with dental troubles, and whose sole idea is toothache drops and extraction?

Would not the literary members of the profession willingly contribute articles devoid of technicalities to any such committee, who could eliminate all objectionable matter, and suppress the name of the author? Scientific subjects could be avoided, and only plain common-sense information need be printed.

Those who are not informed in this regard ought to be able to learn from some authentic source how to properly select a dentist, and to discriminate between a dental office and a butcher shop ; and above all, the public should be warned against the advertising fiend.

Our patients should be able to read in disinterested columns that co-operation with their dental adviser secures the best results ; and those who may think that our advice may be too interested at times should be taught the value of the ounce of prevention.

The traditions of heroic methods practiced in the past should gradually disappear under such an influence, and the prevailing impression that all dental operations are painful should be effectually counteracted ; and the uninitiated should learn that a properly conducted dental office is not a chamber of torture. This one fallacy alone deters a large percentage of the population from intelligently visiting any dentist.

Is it to the credit of the dental profession that nothing appears in the public prints but detrimental articles, intended either as an advertising scheme or upon subjects that have mystified and awed the public, and others that have been written up by reporters who are not competent to handle the subject ? I will give but a single instance of one who recently visited a dental depot for information, and thought he had exhausted the subject when in an article entitled "Novelties in Dentistry," he delineates upon the *cheapness* of artificial teeth, explaining that they cost the dentist but eighteen cents apiece, and makes it appear from a commercial standpoint that a dentist's profit is outrageous at the prices he has seen quoted by the quacks, and then states what a fashionable dentist would ask, in manner calculated to discourage any one from patronizing a man with desirable surroundings.

He gives the impression that the advantage of having teeth crowned is that the crown can be removed for the purpose of keeping the tooth or root beneath it in good condition. Rubber, he states, is the most approved material for plates, and everything in keeping.

If the profession can stand this kind of treatment, together with the way occasional accidents in the dental chair are presented, without forcing knowledge upon the public, it deserves to degenerate. The papers are willing to print any desirable articles ; the only trouble is they don't know where to get them.

It is our duty as a profession to prevent unnecessary suffering ; it is to our interest to increase the general demand for dental service ; it is our prerogative to elevate the standard of dentistry, and it will add to the dignity of the profession to display its learning.

If we crave full recognition from any profession or any class, we must assert our abilities aggressively.

Dental advancement scientifically has been so rapid that the mind of the profession has been engrossed with science alone. Dentistry has been such a precocious infant that it has not had time to develop all the utility possible, or become as serviceable as could be desired.

If the salvation of teeth were proclaimed as widely as the salvation of souls, it would be productive of a proportionate amount of happiness.

What the people know, they have learned by force of circumstances. The erroneous impressions that are prevalent are the result

of depending almost entirely upon the ancient custom of verbal transmission. This would do for savages like the North American Indians, who had no other means of imparting knowledge or even historical events. But because we take a pride in the fact that dentistry has been developed in America, shall we allow it to be justly criticised as clinging too closely to original American customs?

When it is remembered that by virtue of an act of the Municipal Council of Paris, in 1881, the children of the public schools of that city have their teeth examined twice a year, we should not forget that we are behind the age as projectors.

If all who require the services of a dentist should apply for relief in an intelligent manner, there would not be dentists enough to attend to them. The colleges and dental depots would rival one another in the quantity of their productions. Dentists could aspire to something more than a competency, and there would be a dental millennium.

The patrons of dentistry need enlightenment, so that they will come to us for advice, instead of giving directions. And when they are informed as well as we would like them to be, the profession will rise to its just and proper eminence.

It is impossible to cover the entire ground in a paper of this kind, and there are many things that could be said that would sound better from older members, and will no doubt be heard in the discussion. I thank you, Mr. President and gentlemen, for your kind attention, and fully appreciate the invitation to present a subject that I trust will bring forth an array of arguments that will result in an educational committee in every society that is represented here to-night.

A METHOD FOR PERFECTLY ADJUSTING THE LOGAN CROWN.

BY GORDON WHITE, D.D.S., NASHVILLE, TENN.

(Read before the Dental Section of the Academy of Medicine, Nashville, Tenn.)

FEW operations in the practice of dentistry equal in success that of a well-adjusted crown, but its perfect adaptation is, however, rarely seen.

What we most need is a ready-made crown, the adaptation of which requires but a few minutes' work after the root has been prepared.

We must consider more particularly the perfect fitting or adjustment of a crown rather than the shortening of the time usually required for the operation; yet no one will gainsay that both perfectness in adjustment and a reduction of time are much needed.

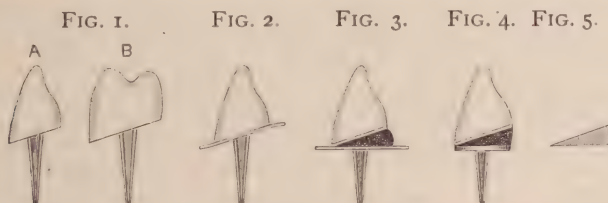
I think it is generally conceded that for all the ten anterior teeth the "ready-made crown," known as the "Logan crown," is far superior to any that has been given to us; but we all know how nearly impossible it is to obtain a perfect adjustment of these teeth. Though I claim to be as skillful in the insertion of this crown as any average dentist, I remember only one perfectly correct fit in my entire practice, and I frankly admit that this was an accident.

By making a considerable change in the present form of the Logan crown, as shown in Fig. 1, *a* and *b*, we have a crown that can be

adjusted in a few minutes, and with a degree of perfectness not yet obtainable by any crown on the market, nor, within my knowledge, by any so far suggested method.

The manner of making the adjustment is certainly as simple as could be desired.

After preparing the canal for the reception of the "Logan pin," select a tooth in the usual way, having regard to correct length, width, and color, and if care has been exercised to select one as near the right length as possible it will only be necessary to touch the buccal or labial point of the neck of the crown a few times with the corundum wheel, and the proper length or bite will be obtained. Next take a disk, or small piece of thin platinum foil, about No. 50, and push through this the pin of the tooth, carrying the disk up against the porcelain, as represented in Fig. 2. With a little drop of Parr's fluxed wax dropped in the triangle, as it were, formed by the backing and the pin, the disk is held securely in place, and the platinum is trimmed around with small scissors, that there may not be any overlapping. Now place around the pin on the platinum a ball of Parr's wax, stick the pin through the second disk of the foil, and rub the platinum with a hot instrument, that the wax and disk may be sealed



together, as shown in Fig. 3. Place this in ice-water to harden the wax, so as to resist pressure. It is now ready to insert, and by pressing the tooth up until the labial surface strikes the end of the root, and having the patient to close the jaws, the correct bite will be secured with the opposite tooth. It will be found on the removal of the crown, that the platinum next the root has been perfectly swaged to the root-end. This second disk is now trimmed according to the outlines of the root. When it is so desired, the palatine side of the root having been left a little high, or just above the gum, the platinum can be split with scissors, lapped, and burnished around the exposed side of the root, to form a partial band (Fig. 4).

After having dried the wax with bibulous paper, and shaped up the approximal sides, these sides are covered with small, triangular pieces of platinum (Fig. 5), by laying the platinum on the wax and rubbing over it a hot burnisher. The crown is now ready to invest, and the investing mixture is poured on a small piece of wire netting, which will prevent its cracking during the soldering operation. The wax having been burned out, this triangular box is filled flush with solder in the usual way and polished. The result is a beautiful and perfect crown, in every respect the most substantial porcelain crown we have.

I frequently make the crown without using the triangular piece of platinum to form the box (Fig. 5), relying on the investment to form the sides. This saves a little time; but it frequently happens, unless

care has been taken to make the wax flush, that the approximal surfaces are not well rounded, and consequently do not finish well. It is therefore safer to use the triangular pieces of platinum foil to form the sides of the box as described, before filling with solder. This plan is particularly adaptable to those cases of fracture which have resulted in a rough root-end, and where it is often next to impossible to get them smooth.

Where it is convenient, or if it is desired, the triangular box can be filled with "body," and baked in a Parker furnace from six to eight minutes. This gives us an all-porcelain crown which fits perfectly to the end of the root. In this case the first disk next the porcelain is left off entirely.

If the manufacturers could be prevailed upon to give us a tooth of this shape, it would greatly facilitate the operation of making a perfect-fitting and beautiful crown by this method as described.

YESTERDAY, TO-DAY, AND TO-MORROW.*

BY W. C. BARRETT, M.D., D.D.S., BUFFALO, N. Y.

MR. PRESIDENT AND GENTLEMEN,—In considering the influence that the act which we propose to consummate this evening shall have upon the future of our profession, it is well to look back adown the vista of the years that are gone. A great orator once said that he knew of no way of judging of the future but by the past. Numbering the few milestones that mark the decades of modern dental history, and judging the rate of progress in the future by the years that are behind us, we may well be lost in wonder when we consider what another century must inevitably bring forth. When we think of the pit from whence we were digged, and compare our small beginnings with the present, there seems no limit which can be put to future progress.

Could Hayden and the Greenwoods have anticipated such a gathering as that we witness to-night? Suppose that some wonder-working seer had unfolded to their mental vision a dental profession comprising nearly twenty thousand practitioners, with thirty colleges, twenty journals, and a hundred and fifty established dental societies: what, think you, would have been their amazement? Yet one century of history has seen all this accomplished.

When Hudson and Gardette first called themselves dentists, operations upon the teeth were more rare than they were among the ancient Etrurians or Egyptians three thousand years ago, and oral practitioners might be numbered upon the fingers of one hand. Few had ever heard of such a practice. There was no such thing as dental education, for there was nothing in which to educate men, nor any place where they might be trained. Not only must the ore be smelted and refined, but it must be digged from the earth.

Yet even in that early day there must have been something attractive in the possibilities of dental practice, for it drew to itself men

* Abstract of an address delivered at the New York Academy of Medicine, on the occasion of the presentation of "The Barrett Museum of Comparative Anatomy" to the Odontological Society of New York, April 18, 1892.

of unusual ability. Hayden, the Greenwoods, Gardette, Koecker, and others might have shed luster upon any profession. Some of the pioneers of dentistry must have been men of great natural ability, unusual perseverance, and have possessed inventive genius of a high order.

Take from the best of us of to-day the implements and methods which are the results of modern investigation and discovery, and what would our practice be, and how much of our boasted success would remain? Obliterate all comprehension of anesthesia and of obtunding agents, strike out all information concerning fermentation, sepsis and antisepsis, efface all modern perception of the conditions involved in inflammation, imagine complete ignorance of the corrosive powers of arsenic in devitalization, cancel all knowledge of the remedies of our present *materia medica*, and go back to the former ignorance concerning nearly all the pathological changes which form the basis of our present practice, and what would be our professional condition, and by what means would we again make ourselves essential to the health and comfort of the people? Then remove all the modern preparations of gold, banish the multitude of beautiful and useful instruments that fill our cases, exclude the dental engine and all forms of mallet-pluggers, excavators, and all kinds of pulp-canal implements, put away the rubber-dam with all the train of illuminating thought which its adaptation has brought us, reduce men to their bare hands and the use of the few tools which they could forge out, each for himself, and think you we should be enabled to make history as these men made it? Could we carve out for ourselves names that would endure when our fortunate successors were utterly forgotten? I tell you there were giants in those days.

And the men whom I have named were succeeded by others of not less ability, and of greater information.

The practice of those early days was exceedingly restricted. The practitioners were necessarily peripatetic, and traveled from one field to another. There was not enough of work in any one place to warrant a continued residence, if we except a very few of the largest cities. Cleaning teeth, the insertion of an occasional very simple filling, and the placing of a few pivot teeth, formed the sum and substance of nearly all that they were called upon to do. But as surgery grew out of the barber's bleeding and cupping, so modern dentistry has been the outcome of that crude practice.

When before the minds of the pioneers of less than a century ago there came the vision of the possibilities that the future contained, when the conception of an organized profession took possession of them, there was a great work to be done. Professional feeling must be created. A code of professional ethics, to which all could subscribe, must be elaborated. A professional curriculum must be determined. Schools in which to train students in that established line of study must be opened. Journals must be published and books written, that the coming profession might have a literature. Educated men must be enlisted, that the reproach that dentistry was made up of the illiterate might not be urged against it. Societies to promote social intercourse must be formed, and men must be taught that upon mutual aid and reliance rested the whole of the future of dentistry.

All this was done. The first book has grown into a library; the

single journal has had numerous successors ; and the one school has been the parent of many, each with its corps of learned professors and its halls thronged with eager students, pursuing a curriculum of study that four years are scarce enough to master. Dental practice is as fully recognized as is that of the oculist or the dermatologist. A world's congress of medical men invites us to their midst upon an exact equality with other specialties. Our practice has been immensely broadened. Oral pathology has become the field that has attracted men of mental might. Oral surgery is as well known as orthopedic. The dentist is a professional man, acknowledged and respected in all lands. Especially in America has his professional skill become proverbial. His manual dexterity and the beauty and stability of his operations are known to all men. In his own chosen practice his position is assured, and there seem no new worlds to conquer.

But while we have been laboring to establish our professional status, the broader field of general science has not been equally cultivated. If we in America have climbed to practical heights unknown to the European dentist, has not this very effort in that direction distracted our minds from the broader training which the latter has received? If our fingers are better educated, may it not sometimes be that it is because we have in a measure neglected our brains? We have made ourselves first in practical affairs, but in theory we are not what we might be.

Let it not be forgotten that the filling of teeth and the treatment of oral diseases are not science. They belong to professional work. Whenever study is directed to some practical end it is no longer philosophy, but it becomes applied labor. True science means the acquisition of knowledge for its own sake. It implies the gathering of information without the expectation of material profit. When one studies the human teeth with the view of making the knowledge serve the ends of a vocation in life, it is merely professional study ; but when one commences an examination of the general subject of dentition, of the *Didelphia* for instance, that the area of human intelligence may be broadened, that is real scientific work.

In this view, we in America have not made the scholarly progress that is desirable. Comparative dental anatomy is not generally taught in our schools. We find some of our journals ostensibly devoted to dental and oral science when pure questions of philosophy are almost unknown to their pages, because of the protests of their subscribers, who demand only the practical. The great body of American dentists have advanced but little beyond a high ideal of office practice. In our best societies, but lately, scientific papers were met by the sneer, "That isn't dentistry." But I am happy to say that we are obtaining a comprehension of a better state of things. When we fully recognize our own deficiencies and plainly see what is lacking, our good judgment and professional pride will prompt us soon to supply the needed culture. It is to awaken our intelligences to these facts that I voice these unwelcome truths. Already there are signs of an awakening in our ranks. A better class of students is presenting at the doors of our schools. Men of mental training and scholastic discipline are entering dentistry. They demand a broader teaching than that of the past. A dental college with but four or five professors, or one that comprises in its faculty only men of

mediocre abilities, will no longer be patronized by progressive students. Those engaged in teaching recognize this fact. Within the past five years the usual curriculum has been almost doubled in comprehensiveness, and yet we have not reached the limit of the demand of the awakening intelligences of dentistry. The graduates of to-day desire to be real professional men, and a considerable proportion of them wish to explore the field of the pure cognate sciences.

This thirst for knowledge indicates the commencement of a new state of professional affairs. The next generation will be better informed than is this; but its individual members must have the means of instruction, and it is our duty to provide them.

No one can obtain a reputation for learning until he becomes really erudite. He may claim to be scientific with every breath of his body, but it will never be conceded until he has made some real advancement in that direction. Educated men are not deceived, and they will measure these pretensions correctly. All our boasted practical skill will not give us standing in the world of science. We may as well comprehend the fact that we cannot claim philosophical eminence because we are doing good, practical, professional work. We have in our ranks in America few men who have made for themselves a recognized name in pure dental science. There is not an accepted authority in comparative dental anatomy in our midst to-day, while it is a subject that does not interest the average dentist at all. This may be unpalatable, but it is the naked truth, and until we arouse ourselves to a comprehension of it we shall not be stirred with the proper zeal to rise to a higher level. That is why I speak as I do, instead of tickling your ears with glowing, fanciful accounts of imaginary attainments.

How many in our profession comprehend the basal principles of true dental science? How many can name the monophyodont orders of animals? Nay, more; how many know the dentition of our most common domestic animals? In one of our most widely read dental journals there was lately a communication from a dentist, a graduate of one of our dental colleges and a practitioner of some years' standing, in which he inquired if dogs shed any teeth beside their cuspids. He had lately noticed that a puppy was getting new cuspids, the old ones having been removed as the deciduous teeth of children are lost, and the fact filled him with amazement. The editor of that journal seemed unable to give him the information sought, but published the inquiry to ascertain if there was any one else who could illuminate that darkened understanding. And yet these are matters that every dental student should be first taught. They should form the very basis of all professional teaching. What is more proper than that the student in dentistry should commence his studies with an examination of dentitions?

We have seized upon a portion of the broad field of science, and are occupying it. If we do not properly cultivate it we shall be recreant to our trust, and will be held accountable to the world for our deficiencies. The great discoveries in this important department must be made by ourselves, or it will be a reproach to us. Scientific investigation has made important strides in our direction during the past decade. The field is already ripe for the harvest. Where are the laborers? The answer comes from our schools, besieged by a throng

of students of a better mental caliber and training than have ever been seen before, by men of education, men of studious tastes and habits, who demand only the opportunities for fitting themselves for the great work that awaits them. The hour has come; the men are at hand, who wait only for the means and facilities for study. Where are the museums, the collections of practical objects, the osteological and anatomical aggregations, the illustrations of the laws of science, without which progress cannot be made? Where are the opportunities for training students in the basal principles of their chosen specialty? What dental school has even the foundation for a scientifically classified collection of the dentitions of the mammalia? What teachers are engaged in investigating this essential field?

Two years ago this question might have been asked in vain. Nowhere in the world, so far as my knowledge goes, did there exist in the possession of any dental school, society, or individual an attempt at a classified collection of the dentitions of any number of the orders of animals. There was no museum in which skulls were arranged according to the teeth. And yet, in the identification of species, there are no organs which afford so many specialized peculiarities as do these.

The first positive step in the advancement of purely scientific dentistry in this country was when a few men of liberal ideas and minds bought the collection now in the rooms of the Odontological Society in this city. I verily believe that this marks a new era in dental progress. Gardette and the Greenwoods founded a new practice in America. Harris, Bond, and others reduced this to a recognized system, and established it upon a practical basis. They were the fathers of the modern methods, built upon the records of experience and mechanical law. They laid the corner-stone of American operative dentistry. I believe that the men who placed within the reach of the dental students of this country the present collection will have laid the foundation for a new dentistry, for a higher, better, nobler education of the practitioners of the future. They have made it possible for men to study the laws which govern our profession from a scientific standpoint. It is a school by itself, and is to science what the modern college is to practice. If it receives the attention that is its due, if it is fostered and encouraged, it may yet grow to grand proportions. It is a seed sown which, if it shall have fallen on good ground, will bring forth fruit a thousand-fold. I am more proud to have my name connected with it, however unworthily, than I would be of a monument of graven brass, for I believe this the more enduring of the two in its results. It is a constant reminder to all those who view it that there is something in dentistry besides mere muscular exertion. It is a testimony to the medical men connected with this academy that dentists study something else than the accumulation of the almighty dollar.

Am I exaggerating the importance of this step, think you? Suppose some one had predicted the results that were to flow from the founding of the first dental college. Would he not have been pronounced a wild enthusiast? If the benefits that were to accrue to an as yet unorganized profession from the formation of the first dental society had been prophesied but in half, the prophet would have been laughed to scorn. And is the opening of the first scientifically classi-

fied dental museum an event of less importance to the world? I hope to see a wave of good influence proceeding from it that shall not cease until it has swept quite around the professional world of dentistry, without one rock of ignorance upon which to break. I hope to live to see the day when such a museum will form an essential part of every teaching institution of the land. Then, and not until then, will begin the scientific development of our beloved profession, that shall not rest till it sits with law, medicine, and divinity, enshrined in the affections of all men, worthy the profoundest study of the sage in every land.

THE EFFECT OF FOOD ON THE TEETH OF ANIMALS.

BY CHAS. T. HOWARD, D.D.S., ROCHESTER, N. Y.

(Read at the joint meeting of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York, October 26, 1892.)

A KNOWLEDGE of the teeth of animals, their arrangement, the manner of using them, the food that is taken, their condition in mature years, and the relation of surrounding tissues, ought to be of value to the dentist. Especially should this be true in its bearing on food and dental hygiene. On this subject we certainly need more light, and here is a field that gives promise of being able to furnish much of that needed light.

Dental hygiene might be divided into two heads, artificial and natural.

In the former we have made great progress. The material accumulated is abundant. The brush, with its infinite variety of shapes, material, and sizes, the powders, the liquids, the antiseptics, germicides, picks and strings, the practices followed and theories indulged in, all bear testimony to what has been done in artificial dental hygiene.

But where are we in what has been called natural dental hygiene? What food do we partake of partly for the reason that it helps clean the teeth? Or do we refrain from any because it fouls the teeth? What advice do we or can we give patients in this direction? Do we think of it enough to be able to give any?

How are animals' teeth kept so clean and white? The almost universal idea is that they are always in this condition, but the fact is some are and some are not clean.

With such thoughts as these in mind this paper was promised; and though it falls far short of what was intended, the hope remains that what little it brings will be of some value.

As before indicated, there are degrees of cleanliness in the teeth of animals. It seems to be governed by two factors,—the ability the animal possesses by the means with which he is naturally supplied, and the character of his food. Probably the carnivora stand first in this scale of degrees of cleanliness. On examination of their teeth, the surrounding structures and the character of food taken soon point to reasons why this is so.

The carnivora are well provided with natural means for keeping their teeth clean,—by shape of teeth, by manner of occlusion, by surrounding structures, and by the character of the food used. The approximal surfaces are so small as to be of little account; the lingual

surfaces are well exposed to a most active tongue. The palatine surfaces of the upper and labial and buccal surfaces of the lower teeth are constantly and thoroughly rubbed as they pass one another in the scissors-like motion. The labial surfaces of the upper teeth are in contact with a rather active lip. Thus all surfaces are well cared for, save the buccal surface of the upper molars; and some carnivora have a rough tongue which is almost as good as the best brush.

On examining the jaws of carnivora, we find that this one weak place, the buccal surface of the upper molars, is where the greatest amount of salivary calculus collects and discoloration occurs. Of twenty-two wild carnivora examined, only three had any tartar on their teeth, and it was all in that location; and of sixteen bears, three had tartar in this same place, while one had a trifle on a lower molar. The other nineteen of the wild carnivora and twelve of the bears were perfectly free from tartar. This shows what a large proportion of well-cleansed teeth are to be found among these animals; and it also shows how by a study of the mouth we can point out the place where tartar would be found if any existed there.

Perfect as the carnivora's natural cleansing arrangements may be, they are not equal to every emergency, for when we examine the mouth of the dog, salivary calculus is found to be nearly twice as prevalent but in the same positions, and decay makes quite a showing.

Thus in thirteen dogs examined, seven were free from decay and tartar, while two had tartar only, and four had more or less dental caries, one jaw showing thirteen separate places. What can this condition of things in the dog be attributed to, if not largely to his food?

The herbivora are not supplied with as good natural means for cleansing the teeth as the carnivora. This partially accounts for the greater amount of tartar and discoloration. Their teeth strike squarely on their ends. There is no sliding past one another, that does so much in cleansing the palatine and labial surfaces for the carnivora. There is no rough tongue to act as a brush of the highest order, as in the feline tribe, and the lips are not so freely movable.

But very likely their teeth would present a far worse appearance than now if they did not chew the cud. In all the jaws of herbivora examined, except the very young, excessive discoloration was found, and tartar was very common.

But the arrangement of the teeth, their manner of occlusion, and the character of surrounding structures are not the only factors to be considered. Their food is largely responsible for the conditions we find. No food is better suited for cleansing the teeth than the muscular fiber, connective tissue, and tough skin eaten by the carnivora.

Far different from these is the soft, juicy, gummy character of growing vegetation. Their hydrocarbons furnish food for the destroying bacteria, and are rapidly converted into acid products, besides furnishing a supply of free acid already in their tissues.

There is another factor that may help to make animals' teeth more rugged in character. A constant weeding process is going on. Weak and sickly wild animals have very poor chances for even limited life or the propagation of their kind. Thus there is at work a means for keeping up a high standard of dental structure, as well as perfect physical development in other directions. Then it may be that

when we come to the dog of civilization, less should be expected of his teeth than from those of the wolf or fox. And yet his food is so different from what he would naturally eat in the wild state that we would look in his mouth for dental lesions unknown to his wild cousins, at least in extent of injury, if not in kind.

Still, there is more or less "selection and survival of the fittest" among dogs, and although perhaps not to the same extent as among wild animals, yet it is probably sufficient to prevent a degree of deterioration that would entirely account for the loss they suffer in tooth-tissue. Although provided with all the natural means toward perfect dental hygiene possessed by his race, yet when using food supplied from man's cook-stove and table he has to pay for his modern conveniences.

If different varieties of food have various degrees of value as to their cleansing properties, why do we not take advantage of it? What is there to hinder our partaking of them in the order that will bring the cleansing ones in the last course? Many a time after partaking of the more substantial portion of a meal in which meat and well-baked bread played an important part, have I wished that I could eat of the dessert without fouling my teeth. Others have the same feeling when their attention is once called to the subject.

CORRESPONDENCE.

PYROZONE.

New York, Dec. 15, 1892.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—In my paper "Fancies and Some Facts," published in the December number of the DENTAL COSMOS, I find my reference to volumes of gaseous oxygen yielded by decomposition of hydrogen dioxid (H_2O_2) is inaccurate, as the volume varies greatly with the temperature, and in other respects Messrs. McKesson & Robbins indicate that the "commercial volume" is unscientific and indefinite, as will be seen by reference to the *American Druggist*, Jan. 15, 1892, also to a reprint of the same on page 412 of the DENTAL COSMOS for May of the same year, in which it is shown that at that time none of the so-called "fifteen-volume" solutions of "peroxid of hydrogen" contained 3% H_2O_2 , which medicinal pyrozone can be proved to contain by the test on the back of each bottle. My results, in a clinical experience extending over seven months, indicate that, regardless of volumes, the strength of medicinal pyrozone, 3% H_2O_2 , is lasting, and this has made me use it and prescribe it for my patients, both children and adults, in preference to any other. The antiseptic pyrozone, 5% H_2O_2 in ether, and the caustic pyrozone, 25% H_2O_2 in ether, I keep entirely for office practice, and find *they* act more promptly on moist surfaces.

Respectfully,

CHAS. B. ATKINSON.

TRANSLATIONS.

A NEW METHOD OF RENDERING THE ICHOROUS CONTENTS OF
ROOT-CANALS HARMLESS BY THEIR CHEMICAL DECOMPOSITION.

BY DR. EMIL SCHREIER, DENTIST, VIENNA.

(Translated from the Oestr.-Ung. Vierteljahrsschrift für Zahnheilkunde.)

I BEG leave to introduce to my colleagues a new remedy, prepared by me, for the treatment of gangrenous pulps of teeth, the application of which is simple and its efficacy unmistakable and convincing.

It would be superfluous at this time to mention in their order all the difficulties and defects of the various methods of treatment of the putrescent canals of teeth.

An expert and patient operator obtains in many cases satisfactory results where circumstances are favorable, and the ever-increasing number of badly decayed roots and tooth-remnants reclaimed for pivot-crown purposes demonstrates the fact that considerable advance has been made in their treatment. Yet no one can deny that such treatment takes up much time, and is often empirical and uncertain.

I hope to be able to prove in the following communication that the treatment here recommended will surely exclude the first two objectionable factors above mentioned, and probably also the latter.

I trust I may be permitted here, for the purpose of fuller explanation, to give a schématic though very unexact definition of gangrene of the pulp, and divide the gangrenous contents of a pulp-cavity and root-canals with their numerous products into those which are there partly dissolved and those which are partly suspended in water. These I shall only mention generally: albumen particles, in various states of decomposition; fatty matters, that is, fatty acids; numerous gas-like combinations, among them, especially, hydrogen sulfid, phosphoric acid, carbonic acid, ammonia, nitrogen, etc., and last but not least, an army of micro-organisms of the most diverse forms.

Let us, for the present, ignoring the apical foramen, imagine that this mass is contained in a miniature test-tube within the walls of a root-canal, where it can be subjected to a chemical transformation. Such a metamorphosis is the soul of my new method of treatment, for which I use the above-mentioned preparation. Its elements are potassium and sodium in metallic form, and prepared in such a manner that it will adhere sufficiently to a barbed nerve-broach in small particles. After the opening to the canal has been cleaned and fully exposed, I insert in the canal a nerve-broach which has some of the preparation at the end; immediately a smeary mass is seen to spring forth with a hissing and bubbling noise. Upon smelling at the broach, an odor materially differing from the one before the insertion will be noticed. It distinctly resembles that of soft soap, which at once indicates the chemical reaction which has been brought about. The two alkali metals inserted into the root-canal come in contact with a watery liquid. Immediately the well-known stormy reaction takes place; the water is decomposed, with the development of considerable heat, by the production of potassium and sodium hydroxid and hydrogen. This latter burns up partially. In any case this nascent hydrogen can have but good effects for the present purpose. The sodium and potassium hydroxids unite with the fatty substances to form soap, which accounts

for the characteristic odor. The mouth of the canal is now wiped clean, as well as the broach used ; another small portion of the preparation is then taken up with the broach and the manipulation repeated, only this time penetrating deeper into the canal. It is not likely that more matter will discharge from the cavity, and when the procedure has been repeated several times the contents of the canal will be transformed into a more solid mass, which will adhere to the extractor, from whence it can be removed. The process of clearing out soon becomes hardly perceptible, but after reaction has ceased the strong alkaline soaps and free alkali develop their effect. It is generally known that alkalies render albuminous matters soluble. Through this process any remnants of pulp-tissue which may yet stick to the walls of the root-canal are loosened and macerated. This property of alkalies endows them with a penetrating influence, which I desire to mention because of earnest pleas for the abolition of carbolic acid on account of its quality of coagulating albumen, many dentists using ethereal oils only for disinfection.

The final cleansing of the root-canal is to be completed at a second sitting three days later, the cavity meanwhile being closed with wax.

As mentioned before, the contents of the canal adhere readily to the nerve-extractor, though I put little value on cleaning the canal entirely, being convinced of the utter annihilation of all micro-organisms by the treatment given. I clean the cavity as well as I may without losing too much time, and fill the tooth with wadding saturated in alcohol. I use alcohol so as not to be accused of applying any other pronounced antiseptic.

Probably nothing substantial can be brought up against the alleged theoretical deductions. The question at present is, How does this treatment result in practice?

I. Are no irritating substances driven through the apical foramen into the alveolus by reason of the violent reaction, caused by the development of gases, at the time of the insertion of the extractor dipped in the preparation?

II. Does the preparation adhere firmly enough to the broach to insure contact of the preparation with the entire contents of the root-canal, while being forced through them, or is it rubbed off at the entrance, where it would remain without further effect?

III. Can a complete sterilization be proved through reliable bacteriological examinations?

Question three must remain unanswered at this time, as I have made only faulty and insufficient tests, unreliable as demonstrations. Although acquainted with the rudiments of bacteriology, I hesitated at the solution of this question ; but I have performed three inoculations on gelatin with the contents of root-canals after treatment, and twice have I brought the end of a cotton wad, which had been forty-eight hours at the bottom of the canal, in contact with the same material, but the gelatin shows no germs up to the present time, after twelve and sixteen days respectively. But, as already mentioned, I submit no proof in these tests.

The possibility of causing an infection through the apical foramen is certainly justified, but such infection will rarely occur. The diameter of the root-canal constantly diminishes toward the root-point, and the gases developed through the reaction generally find a ready

outlet at the entrance. To decide this question, I have made the following test : An extracted cuspid with a collapsed pulp was pushed through an ordinary cork far enough to let the root protrude. The cork was then firmly pushed into a bottle filled with water, which was then turned bottom upward, so that the root could be seen extending a certain distance into the column of water. The contents of the pulp-canal were then subjected to the reaction, and any gas forced through the root-point must of necessity have been indicated by little bubbles rising to the top of the water ; but none made their appearance. In this case, therefore, the danger of infection is no greater than in the present mode of treatment, where it is necessary to introduce the respective antiseptics on wadding into the watery mass, which entails the possibility of forcing putrescent matter directly into the alveolus ; besides, the broach armed with a wrapping of cotton at the end might act as the plunger of a syringe and force the contents of infectious matter before it.

I assert, therefore, that the preparation adheres sufficiently firmly to the extractor to be introduced into the root-canal, there to develop its properties. It is, of course, necessary for the operator to display a certain amount of care. When this is done, one may reach points which with the present modes of procedure are inaccessible, and teeth which had been given up may be treated and reclaimed by this method.

The operator who proceeds carelessly may naturally cause an infection in testing the remedy, or may not obtain any results at all.

The following is a report of cases treated to date :

There are only sixteen so far, of which five are upper bicuspid, three of them fistulous cases, which have all since been filled with Hill's stopping. The filling was in all cases performed at the second visit ; three to eight days elapsed between the first and second visits.

Two small upper incisors, one with a fistula ; and filled with cement.

Two upper central incisors, one with a fistula ; the other contains a piece of nerve-extractor, which broke off during treatment ; filled with cement.

Two upper cuspids ; closed with Hill's stopping.

Three lower bicuspid ; filled with cement.

One lower cuspid ; filled with cement.

One lower molar, the canals accessible only to the finest needles, and then but half the distance ; closed with wax.

No definite conclusion can be drawn from these few instances, yet one may presume with some certainty that the alveolus was affected or infected in none of these cases during treatment.

A word to those who intend to test the merits of this preparation. The nerve-broach should be springy, because it facilitates its insertion into the canal. When the preparation has been introduced, turning and distributing motions should be made with the broach, so as to mix it into the watery substance contained in the cavity, and the effect will immediately be noticed by a hissing noise. It is further to be observed that the broaches break easily after having been used several times. Occasionally the insertion of the broach causes pain to patients, which is due to partial vital existence of the pulp. In such cases it can almost invariably be removed in one piece, when it presents a glassy appearance. It is apparently loosened from the wall of the root-canal by the action of the alkali.

I make this communication public, with the request to test the truth of the assertions made therein. I hesitated for a long time to come to the front with this new treatment, but I found courage to do so in the reflection that I might do the profession a service.

Its application is so simple that every one can experiment with it without any special preparation. No complicated apparatus is required for the use of this remedy, and its cost is but little.

It is so seldom that we can obtain a remedy simple and easy of application, that we may rely on the lenient judgment of our colleagues when we have recommended one with these attributes.

APPLICATION OF ETHYL CHLORID AS A LOCAL ANESTHETIC IN DERMATOLOGY.

BY DR. S. EHLMANN.

(Translated from the *Wiener Med. Wochenschrift*, June 25, 1892.)

THE manifold small but often quite painful operations which come under the observation of the dermatologist justify the induction of complete general anesthesia only in the rarest cases. The local anesthetics heretofore in use can be applied only to a limited extent, which is especially the case with cocain.

The external application of cocain solution is only effective in cases of surface itching of raw or sore areas. The subcutaneous injection of cocain, although so beneficial when treatment is confined to a circumscribed spot, cannot always be utilized in dermatology, and for this reason, in small operations like scarifications, etc., representing small but numerous fields or spots scattered over a large space,—for example, in opening tubercles or pimples,—one would be compelled to give a separate injection for each and every sore spot, which is not practicable, because a patient, though willing to submit to one or a few insertions of the hypodermic needle to facilitate local anesthesia, would most likely object if this were repeated too often.

It has also been noted that intoxication results very frequently where cocain is used in so many places at once. In such cases we have also to deal with irritable, anemic individuals, which greatly emphasizes the unpleasant points above mentioned.

Local anesthesia by other methods cannot easily be confined to a small spot, and its employment often demands considerable apparatus.

In regard to the points mentioned, ethyl chlorid offers decided advantages.

When anesthetizing an affected surface, it is desirable to first apply cotton wads or pads which have been saturated with a five to ten per cent. solution of cocain (because the direct application of ethyl chlorid causes at first a slight burning sensation) before inducing the more complete local anesthesia by means of ethyl chlorid. In this manner I perform scarifications, excochleation of lupus, etc., causing absolutely no pain. I have noted nine cases who could not be induced otherwise to permit local treatment.

In opening boils, the spray does good service, as cocain cannot in such cases be applied subcutaneously, because the incision is too painful, and the effect of the drug is insufficient. Even in gatherings

where the skin was one centimeter thick, an incision was effected without pain.

But I have used ethyl chlorid mostly for scarifications and opening pustules, and I have no doubt that in these cases, as well as in molusca cutanea and the various forms of lupus, it will acquire precedence over other anesthetics, and that many patients who have flatly refused treatment will, after the first experience with ethyl chlorid, willingly submit. This refers especially to scarifications where it is important to make numerous incisions in a small space with instruments supplied with many blades, a therapeutic procedure well adapted for the localization and even extinction and cure of various forms of lupus.

PROCEEDINGS OF DENTAL SOCIETIES.

TWENTY-FOURTH ANNUAL UNION CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Concluded from page 1006, vol. xxxiv.)

FIRST DAY—*Evening Session* (Continued).

DR. W. W. COON read the following paper, entitled,—

COPPER AMALGAM PLUS STANDARD ALLOY.

The many and almost universally dissentious writings about copper amalgam indicate that the majority of those who ever did use it have now discarded it, and by the time they finish repairing the last copper filling that has "cupped" their vocabulary will have to be enlarged, or they will be unable to fully express themselves concerning this material. A few writers I have noted who held out hope for a permanent usefulness of copper amalgam. Dr. J. Allen Osmun, in an article entitled "Some Observations on the Use of Copper Amalgam" (published in the July, 1892, issue of the *International Dental Journal*), says, "If copper amalgam fillings be worked as I am endeavoring to demonstrate, heating many times, with thorough rubbing, clearing them of all excess of mercury, they will stand the test in every way and become a thing of beauty and a joy forever." Certainly this would be the plastic desideratum for many posterior cavities. Personal experience, however, makes me skeptical regarding so broad an assertion. Dr. Osmun's idea is that thus working the material the copper is tempered, and there being no excess of mercury the filling will stand. While I believe that this care in the manipulation of copper amalgam makes the filling better, I do not apprehend that any perfection in the matter of manipulation or manufacture will produce with pure copper and mercury alone, a filling that will not possess surface-disintegrating possibilities.

To weigh with Dr. Osmun's opinion, we have that of Dr. W. B. Ames, as expressed in a paper which appeared in the May, 1891, number of the DENTAL COSMOS, entitled, "Why Copper Amalgam Wastes in the Mouth." He says, "That heating, and especially repeated heating, is injurious to copper amalgam where the very best results are required, is unquestionable, as the 250° F. that is required

to break up the crystals and set mercury free is sufficient to volatilize the mercury to a very appreciable extent, as can be seen by holding a piece of gold over the amalgam during the process. While I do not consider careful heating to be as injurious as the extensive trituration that has been so generally advised, I think it is well to use only fresh amalgam in such cases, as we have reason to fear that otherwise wasting might take place."

In the discussion of the paper above quoted from appears the opinion of Dr. L. E. Custer, expressed this way: "Perfectly amalgamated fillings, with no excess of mercury and properly manipulated, may be used in all positions and conditions of saliva, and be free from waste."

I regard all of the above quotations erroneous and delusory in so far as they express confidence in the continuous stability of pure copper and mercury fillings, however manipulated.

Dr. J. E. Register, in the last issue (October, 1892) of the *International Dental Journal*, has under the title of "Gold Added to Copper Alloy" made public a suggestion which was made to him by Dr. H. C. Register, that we hope will prove valuable. Here let me deprecate the use of the word "alloy" in reference to copper amalgam (*i.e.*, pure copper and mercury). In Attfield's "General, Medical, and Pharmaceutical Chemistry," page 192, is found the following: "The compound formed in fusing metals together is usually termed an alloy, but if mercury is a constituent, an amalgam." Therefore, the term alloy may only be rightly used for a combination of metals not embracing mercury as a component. The suggestion was that a sheet of No. 4 soft gold foil be dissolved in an ounce of mercury, and after making the ordinary copper amalgam plastic by heating and triturating, all the mercury possible is squeezed from it, and it is again triturated with the addition of mercury prepared as above stated. The first half of the cavity is to be filled with the material ordinarily plastic, but the last half of the amalgam used is squeezed very dry.

I have used copper amalgam several years, and have had the experience common to all who have made occasional use of it since its *début* in 1887. Within a year's time only have I used it in a way to give it a fair chance to do its best for carious molars. Had I read Dr. W. H. Trueman's paper, entitled "Copper Amalgam: Its Virtues and Its Vices," which he presented to the Pennsylvania Association of Dental Surgeons, April 8, 1890, and which appears with its discussion in the *DENTAL COSMOS* for June, 1890, at the time of its publication, instead of waiting until last week, when it attracted my attention as I was looking through the journals on this subject, I probably would not have commenced what is now my common practice, viz, making the surface of copper amalgam fillings invulnerable by a coating of high-grade alloy which protects the underlying amalgam from electro-chemical dissolution. Dr. W. H. Trueman said "that if the two amalgams (*i.e.*, copper amalgam and an alloy amalgam) are inserted in a cavity at the same time, the alloy amalgam will not harden." Continuing, he said, "This has been questioned. It requires but a single experiment to settle the matter beyond all cavil." This settlement was substantiated by Dr. Chupein, who said in his discussion of the matter "that he had once used it (*i.e.*, copper amalgam) as a foundation for a filling, and then he found

it, as well as the other amalgam which he had used over it, so granular that he removed the whole filling, and refilled with copper amalgam alone."

I must beg pardon of these gentlemen for not knowing that the matter had been settled this way. After repairing my first "cupped" copper filling, I commenced finishing copper amalgam fillings with Standard Alloy (for a knowledge of this material I am indebted to Dr. G. P. Rishel), and I am not credulous enough to believe that my ignorance of the way the matter had been settled once for all by Dr. Trueman is sufficient to account for the success attained by this method. The fillings harden very promptly, and present an enduring surface, which allows the underlying copper amalgam to fulfill its extreme usefulness in maintaining the most perfect adaptation to cavity-walls of any known amalgam. The method is simple. The cavity is prepared as for copper amalgam alone. Copper amalgam is prepared for use in the usual way, care being taken to have no excess of mercury. The cavity is filled with copper amalgam, to completion if you please, then a shallow portion of its entire surface is removed, wiped away with a pellet of cotton, spunk, or other means, and sufficient Standard Alloy (Eckfeldt & DuBois's) is amalgamated and added to the filling to complete it. This becomes perfectly united with the copper amalgam, and will not separate. The manipulation of Standard Alloy differs from that of copper amalgam. With the latter, ball burnishers are used with a rotary motion; with Standard Alloy, flat-end instruments are used with a tapping motion, which secures the coating of alloy in place.

This alloy is very fine-grained, and the finished plug presents a surface that is capable of a high polish. If no pieces of copper amalgam have been allowed to get mixed with the amalgamated alloy that is added to the copper, it keeps a good color.

This puts to its fullest usefulness a material which is almost universally conceded to be at once the best and most unreliable preserver for posterior cavities indicating the use of an amalgam. Best, because of its steadfast adaptation; most unreliable, because of its surface-disintegrating possibilities when used alone.

Discussion.

Dr. S. B. Palmer said that he had not used an ounce of copper amalgam, because no matter what process was used in making the amalgam or in preparing it for insertion, there were always only two elements, copper and mercury, and under the circumstances these would cause galvanic action in the mouth, and one or the other would be dissolved. When the copper was dissolved, the mercury remained on the surface, and the filling was soft and unstable; on the other hand, if the mercury is attacked by the galvanic action, the copper is left and the surface is hard and black. This action cannot be foretold, as it will depend upon the individual, and will be different even in the same mouth under varying circumstances. There is too much uncertainty about the result to make it a reliable filling-material. In every other amalgam there are three or more metals, and they are not attacked, because they negative the action which would occur between only two. For this reason it will improve copper amalgam to add a little silver.

When a copper amalgam filling retains the bright surface spoken of as a sign of softness and instability, he advised cutting away the surface and refilling with another amalgam. He likened a copper amalgam filling to a galvanic battery, which consists of a copper plate covered with mercury, though, of course, in the amalgam the copper being divided and the mercury permeating every part, the effect was different in degree.

Dr. H. H. Boswell said he had experimented with all forms of copper amalgam, and found one which would stand every test: that was Buck's copper amalgam. He wished those present would give it a trial, as he was convinced they would find it reliable.

Dr. F. H. McGeorge spoke in strong condemnation of copper amalgams in general, and Buck's in particular as being the worst of the lot. He thought it was a mistake to use copper in any way in the teeth, because of its discoloring, and said the more other metals were mixed with it the better it would be.

On motion, the subject was passed, and the convention adjourned to meet for clinics at 10 A.M. the next morning.

SECOND DAY.

The morning session was devoted to clinics. Under direction of the Business Committee, only one clinic was carried on at a time, the convention being called to order, and those present remaining seated the while. This arrangement was found to work very satisfactorily, as each one could see all that was done and hear all that was said, without the usual crowding that is found at clinics.

Dr. W. M. Sharp showed methods of making and inserting porcelain inlays, and restoring porcelain corners to broken incisors. Not having patients at hand, he demonstrated the manner of doing the work by drawings, showing how a corner could be restored by drilling one or two holes in the remaining part of the tooth, and then preparing the porcelain piece by baking it, with pins to correspond with the holes prepared, and applying it with oxyphosphate cement. One case he described was where approximal corners were broken off the two centrals, and one piece of porcelain was made to simulate the lost part from both teeth. This case, he said, had done some years of service. Another was a case of caries on the upper part of a central. The edges of this cavity were cut so that the whole cavity was of the same depth, and a piece of porcelain having been ground to the same shape, was fitted in and cemented with oxyphosphate.

Dr. F. W. Low gave an exhibition of methyl chlorid. He first explained the action of cold on the nerves of sensation, and said that it was very important, if pain was to be avoided, to reduce the temperature as quickly as possible. With the ethyl chlorid it took about three minutes to reduce the temperature of a thermometer bulb to fourteen degrees above zero, while with methyl chlorid, which boils at seven degrees below zero, the mercury was reduced to zero in about five seconds. Even less time than this would be required to obtund the sensitive tooth, and the pain would be only momentary. Methyl chlorid is applied from a copper cylinder with a movable tube, which can be directed to any part of the mouth. As there was no patient present on whom to demonstrate the process,

he put some water in a test-tube, and directing the spray from the cylinder upon it for about twenty seconds, the water was found to be frozen solid.

Dr. H. H. Boswell explained a method of extirpating the pulp immediately by the use of pure carbolic acid. After removing the crown of the tooth for the purpose of crowning, exposing the pulp, he applies a drop of carbolic acid, by means of a pair of pliers, to the posterior part of the pulp-chamber, then by a gentle pumping motion forces the acid down into the pulp. The first touch of the acid forms a scar, which runs ahead of the instrument, so that the latter does not come into contact with live tissue at all, and the pain is so inconsiderable that the patient does not know what is being done. He had a record of fifty-three cases, all successful.

He also exhibited a contrivance, consisting of a mouth-mirror handle and frame, with a piece of soft sponge in place of the glass, for moistening corundum-wheels and holding the cheek away from them when grinding in the mouth.

Dr. C. S. Butler related a case of a second superior molar which had been filled with gold, the filling extending from the crown to the posterior cervical portion of the tooth. It was found impossible to keep the filling in place. He cut a piece of gold plate to the size and shape of the floor of the cavity, and having soldered two short pins to the plate, it was burnished to fit closely and cemented in position with oxyphosphate, and filled over this in such a way that the gold was held by the pins. There was no further trouble.

Dr. G. W. Melotte described a method of welding gold bands for use in crown- and bridge-work, producing a seamless band in which the line at which the ends were joined was no harder than any other part of the band, as it must be when the union is made with solder of lower carat than the band. The process is to bevel the edges to be joined with a short bevel, bringing the parts to perfect adaptation, then apply borax ground in water to the consistence of cream, and with the soft flame of a blow-pipe bring the gold to the point of fusion. The molecules of the gold will unite, making a continuous seamless band.

Dr. G. H. Smith exhibited the Harris improved dental mallet, and the combination dental engine-head.

The secretary read the following communication :

SECRETARY OF THE UNION CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK :

The following resolution was introduced by Dr. J. G. Orton at the meeting of the Broome County Medical Society on the 25th inst., and unanimously passed :

"Resolved, That we extend most cordially the hand of friendship to members of the dental associations of this state now convened in this city ; that we recognize the honorable position to which they have attained as a profession, as the result of the high standard of preliminary education and terms of study required by the schools and colleges of dental and oral medicine and surgery."

LE ROY D. FARNHAM,

Secretary Broome County Medical Society.

Afternoon Session.

The convention was called to order at 3 P.M., Dr. C. W. McCall in the chair.

Dr. C. W. Stainton read a paper on "Our Joint Dental Meetings

and the Expense Account," in which he deprecated the holding of the meetings in expensive hotels, and advocated making attendance at such meetings as inexpensive as possible, so that their cost would not deter those who could not well afford so much expense from profiting by the opportunities for hearing and taking part in the papers and discussions. He also stated that only about one in every five dentists in the western part of the State covered by the districts represented in the convention was a member of his district society, and not more than one in every ten could be depended upon to attend and support the annual union meeting. He thought that in every district earnest effort should be exercised to increase the membership; that every reputable practicing dentist should be urged to join, especially young men who were commencing practice.

He said, "Let us not make the mistake of supposing that the eight-tenths who do not attend regularly our dental meetings are Ishmaelites, —men of ignorance, without character either as men or practitioners. Most of them are men of most excellent character, and thoroughly conscientious in their operations. They have never realized the benefits to be derived from attending dental meetings. Many of them have a firm impression that such gatherings are in the interest of dealers in dental goods; others that they are chiefly for the purpose of gratifying the ambition or booming the reputation of ambitious men. In short, misunderstandings and misconceptions, which we all have of things with which we are not familiar, are dominant with this class."

He claimed that it was a duty of the members to solicit these men to join the societies, and so solicit them that they should be won. "This is missionary work that we are charged by the very fitness of things to perform, and no excuse avails to cover our sins if we do not perform it."

He considered the papers best suited for presentation and discussion before these local conventions were those of a practical nature, such as are adapted to the improvement of those who need it, rather than highly scientific papers which would rather show off the unusual attainments of the few who were interested in such theoretical subjects as evolution, histology, and comparative anatomy.

Discussion.

Dr. F. French approved of the missionary spirit of the paper, but thought that the fear of the government by the rules and regulations of the societies was what deterred many practitioners from becoming members, and this unwillingness to be subject to proper regulations was to be deplored. He thought that the expense of the meetings was of minor importance.

Dr. C. S. Butler said that the effort to get all the reputable dentists into the societies was well worthy of attention, and that a little well-directed work upon the part of the members, or of special committees appointed by the societies, would tend to increase the membership very materially. Every reputable practitioner should be solicited to join. He did not think the expense deterred any such, but the fact is, new men are timid or proud, and do not like to make advances.

Dr. E. D. Downs did not think it proper to go out and solicit dentists to join the societies, any more than it was proper for a dentist

to go out and solicit patients. The society should be made so valuable to its membership that every man would be proud to belong to it.

Dr. Coon said there was one thing young men did not like, and that was the examination some societies held before admitting a member. After standing an examination to get the diploma and the right to practice, to insist upon another before admitting to a society was non-sense, and should be done away with.

Dr. F. B. Darby said he did not understand what examination was referred to. There was no examination in the Sixth District Society. Any reputable dentist of good moral character was eligible to membership, and they did not even insist on the good moral character.

Dr. Barrett said he was decidedly in favor of continuing the union meetings, and rather favored the free banquet. He spoke of the social aspect of the meetings of the British Dental Association, saying they always have a room for a smoking-room, where they have music, singing, recitations, and talking. He thought such social features brought up the ethical side of the profession by the cultivation of the social relations of the members.

Dr. Stainton did not think it unprofessional or undignified for the societies, through its members or through committees appointed for the purpose, to ask practitioners to join. He might never have joined if he had not been asked.

Dr. S. W. Adamy said there should be a law to compel practitioners to belong to the local societies. The medical profession has this law, and we should have it. He thought the reason some stay out of the societies was because they could advertise and follow other practices which they could not if they were members. If we could get them all into the societies and make them live up to the rules that should govern professional men, we would have more respect for them and they for us.

On motion, the subject was passed.

Dr. Osgood extended to the members of the Sixth and Eighth District Societies, as well as those of the Fifth, an invitation to meet at Rochester next year.

Dr. A. M. Holmes read a paper on "The Advantages of Nitrate of Silver in Dental Practice" (for which see page 981 of the DENTAL COSMOS for December, 1892).

Discussion.

Dr. R. H. Hofheinz said he hoped there would be a full discussion of this paper and a broad discussion of nitrate of silver. When the subject was first introduced by Dr. Stebbins, he asked the author of the essay whether he had used nitrate of silver in the way and for the purposes described, and Dr. Holmes had said, "Yes, for forty years." It seems a great loss to the profession that all should not have known of it earlier. In his practice he had found it almost an indispensable remedy, and had arrested decay with its use better than he had ever been able to previous to using it. He spoke of the application of it by means of a silver wire dipped into nitric acid and then inserted into the cavity. The action of the acid on the silver forms the nitrate, and the wire being easily directed, the application is made to the exact place desired.

When the nitrate of silver is used, he prefers to cover it with cement or other non-conducting filling, so as to lessen the effect of thermal changes. When amalgam or gold is used, he either varnishes the cavity, or underlays a thin layer of gutta-percha.

Dr. M. D. Jewell had never had any experience with the use of nitrate of silver as described, but thought it might be a serviceable agent. He would be pleased to hear further from those who had used it.

Dr. S. B. Palmer had used it for a number of years. He thinks the effect is due to the silver, which penetrates the dentine and fills the tubules, and because of this filling the dentine becomes sterile to microbes. The most beneficial effects were observed in cases where crowns or bridges were set and the dentine had been dissolved from under the crowns and bands; by the introduction of nitrate of silver the destruction would be stopped.

Dr. F. W. Lee said he had found nitrate of silver to be effective in cases of erosion. It would harden the enamel and stop the destruction.

Dr. G. W. Melotte had used it with great satisfaction. He said a nice vehicle to carry it to place was a wire, which, being heated and touched to the stick of nitrate of silver, the latter would melt and adhere to the wire, by which it could be easily deposited just where desired.

Dr. Holmes said he applied it by the use of a platinum wire, as described by Dr. Melotte.

Dr. C. T. Howard indorsed the use of nitrate of silver as described in the paper. He had used it for many years as an obtunder of sensitive dentine in places where the color would not be objectionable. He thought the idea of putting it on the surface of gutta-percha fillings and zinc phosphates, and keeping it there to prevent decay, was invaluable.

Dr. Stainton said the use of nitrate of silver had been known to members of the profession for many years, but Dr. Stebbins's paper first made it public property. In his opinion, this one essay was valuable enough to repay every one for the time and expense of coming to the convention; that is, to every one who came with the determination to profit by the opportunities presented to him.

On motion, the subject was passed, and Dr. C. T. Howard read a paper on "The Effect of Food on the Teeth of Animals," for which see page 19 of the current number.

Discussion.

Dr. W. C. Barrett said if we study human teeth only, we would never be able to understand them as we should. Whatever affects the teeth of animals will similarly affect the teeth of men under analogous circumstances. We should remember that the teeth are the same as the bones, except in specialization. The tissues are nearly the same, and proper treatment for any part of the bony structure will be proper treatment for the teeth.

It is commonly supposed that the teeth of animals do not decay; this is a popular delusion. The same is supposed of the teeth of men in a state of nature, which is also wrong. The difference in the liability to decay in different nations is but slight.

He spoke of specimens in his possession : one the tooth of a horse, with a very large salivary calculus ; another in the skull of a male gorilla, with antral abscess and necrosis of the bone, and said that no doubt the gorilla had suffered the agony of the damned with it. He said that frequently domestic animals suffered with the toothache, and as the cause of their irritability was unsuspected, they were considered to be vicious, when they were only exhibiting some of the irritability we would consider perfectly reasonable in ourselves under like conditions. He had known of a pet cat suffering with alveolar abscess, and there was no doubt both domestic and wild animals were frequently so afflicted.

The study of comparative anatomy should be given much more attention than it receives. The result would be that we would be better prepared to treat the teeth of our patients.

Subject passed, and the convention adjourned to meet next morning at 10 o'clock.

THIRD DAY—*Morning Session.*

The convention was called to order at 10.30 A.M., President C. W. McCall in the chair.

Dr. M. D. Jewell read a paper, of which we give the following abstract, entitled,

DENTAL CHEMISTRY.

After referring to chemistry as the most important, and yet by the mass of dentists the least understood of all of the arts and sciences allied to dentistry, and stating that it was his desire in presenting the subject to arouse a desire among the members present for a more intimate knowledge of chemistry, the laws related to it, and its applicability in dental practice to the relief of human suffering, he said,—

“There is probably no profession to which chemistry comes with greater promise of assistance than to dentistry. There is hardly an operation which a dentist is called upon to perform that does not in some way enter the domain of chemistry.

“Mitchell says, ‘Many of the most perplexing problems with which the dentist has now to deal will in due time be solved by the dental chemist.’ This is unquestionably true, and furthermore, when the dentist takes up the study of chemistry in its application to dentistry with anything like the thoroughness that most other branches of his study are now being pursued, then, and not till then, will he possess that intelligent comprehension of the conditions he is supposed to treat that will entitle him to recognition as a scientific man.

“It is surprising to see how meager is the stock of literature on dental chemistry. Every other special branch of study has been written upon until it seems impossible to select any one of them that has not been pretty thoroughly canvassed. If, however, one desires to glean much touching the subject of dental chemistry from current dental periodicals or text-books, a trial will bring disappointment.

“It is not difficult to account for the seeming disregard for this particular study among dental students, when one considers that there are comparatively few men possessed of that spontaneous passion for investigating the hidden secrets of nature so generally characteristic of the student in chemistry. Experience in class, in laboratory, and in prac-

tice has led me to the conclusion that to the average dentist of to-day chemistry is a sealed wall, an unknown, untried, and undesired quantity,—a useless jumble of incomprehensible equations and malodorous chemicals, too ponderous to undertake, too grimy to be inviting, and too dangerous to meddle with.”

The essayist then sketched at some length the historical phase of his subject, giving an interesting *résumé* of the development of chemical science from the time of the alchemists, tracing the more important steps which had marked its advancement up to its present position as one of the most exact of the sciences, giving also a brief presentment of the more important fundamental data of the science respecting its nomenclature and laws of combination, including the laws of atomic weights, gaseous combination by volume, its relation to the determination of molecular and atomic weight, density, etc., together with the electro-chemical theory, chemism, and molecular cohesion, after which he traced the importance of a recognition of chemical laws, and their application in the study of the oral cavity and in dental practice, as follows :

“It is well known that the oral cavity has been likened to a chemical laboratory possessing facilities of material and conditions for a variety of chemical reactions.

“Skill in the construction of gold, amalgam, or other fillings in teeth, or in the adaptation of the finest specimens of crown-, bridge-, or plate-work, even superior skill in the treatment of all lesions of the soft tissues of the mouth, coupled with all the rest, would not of necessity prepare us to deal successfully or intelligently with so common a condition as an acid condition of the saliva.

“First we should understand the principles of chemical action, and then study the nature of tooth-structure, that we may know what phenomena of chemical action we may expect and the remedy to apply that may arrest its progress.

“Lactic acid, the result of the decomposition of saccharine and amylaceous substances, is said to be the most potent factor in the decay of teeth, and most frequently present in acid conditions of the secretions of the oral cavity.

“It is *very* easy to detect an acid ; but how may we determine its character, so that we may know what will be the result of its contact with the neutralizing agent, and whether the new product will not be as injurious to tooth-structure as the acid? If it is *not* hurtful, it is not because of any knowledge of the fact on our part.

“The operation of bleaching a tooth is chemical, and an extremely delicate one, involving intricate laws of attraction and repulsion of atoms, and should never be undertaken without a knowledge of the chemical action of the agents used.

“The object to be gained is the decolorization of the contents of the tubuli of the dentine by the use of an agent that will break up the chemical combination of the coloring matter by uniting with or taking from it one or more of its constituent atoms.

“Chlorin is the agent most frequently employed. The well-known affinity between hydrogen and chlorin would easily lead us to suppose that, if present, H would be the most likely to be given up by the coloring matter, thus producing HCl, which you will recognize as the symbol for hydrochloric acid.

"Dr. Edward C. Kirk, of Philadelphia, has investigated the subject of tooth-bleaching from the standpoint of a chemist, and is on record in tones that make no uncertain sound.

"The various cements in general use are chemical reagents, and in preparing them for use we perform a chemical operation.

"It is of importance that one should understand the nature of the elements here brought together, their relative combining value, and those conditions most favorable to a free and complete chemical substitution, if one desires anything like uniform results.

"A knowledge of chemistry places us in position to judge of the merits of compounds placed in our hands, like the innumerable alloys urged upon our notice, which may be the most unmitigated frauds for aught we know.

"Much has been said and written regarding mercurial sore mouth from the action of mercury in the coloring matter of vulcanite. Chemistry teaches us how we can decide whether free mercury exists in such proportion, by the use of well-known tests.

"The process of vulcanization is chemical.

"Vulcanite is one of the hydrocarbons united with sulphur. Every dentist is familiar with the process, though recent literature upon the subject seems to indicate that there is yet much to be learned in this most common proceeding.

"We mix plaster so often that we have come to do it in the most perfunctory manner. We perform two or more chemical operations each time we attempt it.

"The setting of plaster is a chemical change by which anhydrous calcium sulphate CaSO_4 is changed into hydrated calcium sulphate $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ by the addition of water. CaSO_4 is sparingly soluble in water, and imparts to it that property that we call 'hard.' Those particles which rise on hard water when soap is used are an insoluble calcium stearate, which continues until all the calcium is thus precipitated. Another chemical action occurs when substances like sal soda (Na_2CO_3) are used to 'soften' the water, as follows: $\text{CaSO}_4 + \text{Na}_2\text{CO}_3 = \text{CaCO}_3 + \text{Na}_2\text{SO}_4$.

"We all use some agent to bring about this result, though we may not realize that we are performing an experiment in chemistry. Plaster being slightly soluble in water, imparts that unpleasant 'hardness' that leads us to resort to some agent to relieve us of the difficulty. Sal soda, for illustration, coming in contact with the plaster in solution, immediately exchanges its CO_3 for the SO_4 of the plaster compound, throwing down the calcium in the form of precipitated chalk CaCO_3 , and leaving a solution of Glauber's salt, or sodium sulphate Na_2SO_4 , which is altogether a different combination. Now the soap takes hold.

"This is a very commonplace illustration, but it appeals with some force to the understanding of the dentist who uses much plaster.

"The study of the electro-chemical phase of this subject presents matter of deepest interest to the practitioner of dentistry. Time will not permit us to enter upon its study here. We confidently leave this subject in the hands of Dr. S. B. Palmer, than whom no writer has been more conscientious in his investigations, or more logical in his deductions.

"Leaving our subject with you for discussion, we realize how

inadequate have been both time and effort in placing it before you ; but it is our firm belief that the time is not far distant when we shall have dental specialists in chemistry as well as in medicine.

“ We point with commendable pride to the high standing of American dentistry in the profession, and rejoice at having reached a stage of our career which leaves little more to be desired from our handicraft.

“ Why may we not with equal profit direct our energies to the cultivation of this comparatively untilled field of study ? ”

Discussion.

Dr. W. C. Barrett said that the paper was a concise presentation of the present condition of the science of chemistry, especially as applied to dentistry. Dentists should study this subject more, for the conditions in our domain, where the natural condition is such as to promote chemical action, make it necessary for us to know what chemical action to expect and guard against if harmful. We know more of it than we did a few years ago, for now we do know that chemical action in many cases is related to the proliferation of micro-organisms.

He denied that chemistry could be called an exact science, because our knowledge of it is so imperfect. We do not know even how many elements there are, nor the law of their combination. When he began the study of chemistry there were forty-two elements, and now they have increased up to their present number. We don't know now what an atom is. We say it is something which by combining forms molecules, and their combination forms granules, the granules form cells, etc., and that is all we know about it ; we do not know what it is.

For nearly a thousand years the old phlogiston theory obtained. This was overthrown, and after awhile Liebig held the scientific world in bondage, so that when the proliferation of the yeast-plant was discovered they did not dare to assent to the truth, though they must have known that certain chemical changes were due to fermentative processes. To-morrow this theory may have to be thrown aside.

There is much in chemistry that is incomprehensible. Shall we therefore neglect the study? No, sir. We are after the incomprehensible. This is what makes human progress.

He drew a comparison between the advances made in dentistry during the fifty years in which it may be said to have had an existence as a science, and the advance of medicine during the thousands of years it had been studied and practiced. As compared with medicine and chemistry, the advance of dentistry had been wonderful.

The subject was passed.

Dr. Butler offered a resolution, which upon motion was ordered to be spread upon the minutes, and a copy be sent to the secretary of the Broome County Medical Society, expressive of appreciation of their fraternal courtesy as evinced by their resolution, as noted on a previous page.

Dr. Butler then offered a resolution of thanks to the entertaining society, and the convention adjourned to meet at Rochester, the last Tuesday in October, 1893.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, November 8, 1892, at the New York Academy of Medicine; the president, Dr. William Carr, in the chair.

Dr. L. M. Warner read a paper entitled, "The Dental Education of the Public through the Medium of the Press."*

Dr. C. S. Stockton. There is no subject fraught with deeper interest to the profession than the one under discussion. Every dentist has evolved and revolved the idea how best to instruct the public concerning the care of the teeth. If it is attempted by the individual dentist over his own signature, then he is hedged in by the code of ethics, and the charge will be made that it is not so much an effort to enlighten the public as to fill his own pocket. So the idea of the paper just read, that every society should have a committee, consisting of one or more suitable persons, whose business it shall be impersonally to furnish the press with such matter as the public should be instructed in, is a most excellent suggestion.

The public will not read books or pamphlets on the subject; they will cast them aside as being simply an advertising dodge of Dr. Blank. The public of to-day reads the daily papers, so anything to interest and instruct the public must reach them through the public press. The newspapers are ever open to that which is for the instruction and welfare of the people, and they are only too glad to get it in such form that it can be used. When committees have been formed, or editor, we might say, has been appointed, and the individual element shall have been eliminated and facts and instruction only given, there will be no difficulty in gaining the ear of the public through the columns of the daily press.

The public needs the plainest kind of instruction concerning all that pertains to the teeth. Nine out of ten cannot tell you the number of the first or temporary set; a few more have learned the number of the permanent or second set; as large a proportion, perhaps, think that the sixth-year molar is a tooth to be shed, and they tell you it cannot be a permanent tooth because it has never been shed; and an almost equally as large a percentage think that when the nerve, as they term the pulp, has been "killed," the tooth can never again ache. Only last evening, at my home, I extracted a tooth for a very intelligent gentleman, one versed in science, literature, art, and all learning; yet he inquired of me, "How is it a tooth can ache when the nerve is dead?" And when I explained that it was only "dead teeth" that ulcerated, his exclamation was, "Is that really so? Well, I never knew that before." Many people believe that when a tooth is once filled it should never decay again. They should be taught that the natural covering of the tooth, the enamel, is one of the hardest and best formed materials known, and yet it does decay, and that even the best and most perfect filling is only a patch, that is all, and that the wonder is, not that it does decay again, but that the filling remains and preserves the tooth half as long as it does.

The teeth are the hardest portions of the body, and with proper

* See page 10, current number.

care they should be serviceable and free from pain during life ; but how often is this the reverse ! They frequently are the greatest source of discomfort, and are unserviceable ; they are neglected and ill-treated, and the least considered of any organs of the body.

A statement in the public paper like this, for instance,—“Teeth kept perfectly clean will never decay or ache” ; “The accumulation of tartar on the teeth causes them to loosen, and when once loose they will never be useful again” ; “The teeth are like all other organs of the body—grow upon what they are fed ; if soft things only are eaten, then the teeth, for want of use, become soft and soon decay ; on the other hand, if hard substances are used, then the teeth will harden to meet the demand upon them,”—some such instruction as thus indicated, given frequently through the columns of the public press, would be gladly and eagerly received by the public.

The public should be taught that the decay of the teeth is a disease, and needs the intelligent treatment of a skillful dentist, just as surely as does the disease of any other organ of the body need the care and skill of an intelligent physician, and in fact more so, because if the function of mastication cannot be properly performed, all the other organs of the body may be impaired.

Dr. Kasson C. Gibson. Dr. Warner's very laudable aim, to so educate the people in regard to the salvation of their teeth that it would be productive of a degree of happiness in proportion to that of the salvation of their souls, presents a problem of greatest difficulty.

To educate the masses has ever been one of the greatest problems with which we have been confronted. If men *could* be found in our profession to write articles devoid of all technicalities, and non-scientific, I question very much whether such articles would be accepted by magazines and periodicals whose standard at present is a high one. As for the daily press, such articles, if read, would reach principally people who already understand to a certain extent the care of the teeth.

The great mass of people whom Dr. Warner wishes to educate through the medium of the press could be met in a more practical and effective way by services rendered to them in the many public and charitable institutions of this great city. Through this kind of work we could obtain a higher standing among physicians and surgeons, as well as the confidence of the masses in the ability of the profession.

At the present time the educated class of people who would make up the vast majority of the readers of these articles are as competent to select their dentist as they are their physician or lawyer.

There would be less quackery in our profession if we were able to establish hospitals and dispensaries on the same plan as those already established for the treatment of diseases of the eye and ear. As dentists, we here in New York city are behind other cities. But few members of our profession, compared with the opportunities offered, are identified with hospitals and dispensaries, giving their services in these institutions to alleviate suffering. Furthermore, we ourselves would be benefited by having brought to our notice cases which would rarely come to us in private practice.

That “the medical societies recognize the power of the press as an educational factor *and utilize its literary columns* for instructive purposes” is rather a surprising statement, and inquiry has failed to con-

firm the assertion that they as *societies* make use of the columns of the press for any such purposes.

Dr. E. E. Minner. Some time ago there appeared in the newspapers a number of articles on dentistry which were well written ; but many times since I have wished that they had never been published. I do not think we can educate the public through the medium of the press. A knowledge of dentistry cannot be acquired through the reading of a simple article, but only through the personal experience and direct information communicated in our offices. When they come to us suffering, and are relieved, then is our opportunity as individual teachers. If we take each patient and carefully impart information to him, then we can hope to do some good. Every earnest practitioner can in this way be an educator. The promiscuous writing of articles is of no benefit whatever. All people do not understand them in the same way, and of those who will come and read the articles to you, about one in ten will properly understand them.

Within the past year I was called upon by a representative of the press and requested to write an article upon teeth, I to be one of a favored few to write such articles. There were to be five, and if these five gentlemen would each write an article they were not to be charged, but after that all dentists were to be charged two dollars per line for the advertising "privilege." The other four gentlemen and myself were to get our advertising free, but after that other dentists were to be charged two dollars per line.

Dr. C. E. Francis. Some of the suggestions made by the essayist, and also by the speaker who followed him, are excellent. It would undoubtedly be better for all communities if the people were educated in the way of caring for their teeth ; and it would add to the health and comfort of all individuals if their teeth could be kept in proper order. But the manner of educating the public in this respect seems a difficult problem. We can do much in the way of instructing our patients when they come to us. I explain many things to them when opportunity occurs, and I presume other gentlemen present do the same. But many patients defer calling until their teeth are already much injured by decay, and so lose the opportunity of preventing such conditions.

This matter of writing instructive articles for the press has often been suggested to my mind, but there are objections to doing this. Few persons would care to furnish such articles without some sort of compensation, and if the names of writers should appear their literary contributions would probably be viewed as advertisements.

It may be well to have committees appointed as has been suggested, yet I am not sure that it would be a wise plan, although there is no doubt that the public need better instruction regarding their teeth.

Dr. Stockton referred to a gentleman who did not think that dead teeth could ache. A similar case occurred in my office to-day. A well-educated gentleman came with an aching tooth which he supposed to be a dead tooth, and wondered how it could give pain. This simply shows how little people know regarding these matters.

Dr. George Evans. It would be of great assistance to me and to most dentists if their patients were educated in a few facts regarding the teeth. Their ignorance is a source of continual annoyance. I have hung to the left of my chair, under a silk curtain that is easily

drawn aside, Dr. Abbott's illustration of the anatomical structure of a central incisor, and a number of illustrations of my own. I have one, that of a molar with an abscess, and various other illustrations to explain the different subjects that are brought up and discussed by patients in the chair. I often stop and refer to these drawings. I can thus quickly describe and define to them what is meant by this or that presented in the treatment of their teeth. As to the matters that have been brought up by the speakers this evening, I wish there was some way of instructing patients.

I have often thought it would be a good plan to get up a small descriptive circular. In regard to the pulp, it is as Dr. Stockton explained. Every one calls it a nerve, and they do not know what its functions are, nor what the loss of its vitality means.

They do not understand that a tooth never has an abscess unless it is pulpless, and they are often quite surprised when the subject is explained to them. Another question is the sixth-year molar. Only last Saturday I had to get out a chart regarding the eruption of the teeth to explain to a lady concerning her daughter, that the sixth-year molar is a permanent tooth, and that these four molars form four posts or piers that support the jaw while the teeth anterior to them are erupted. Another question is, "Why do teeth once filled ever decay again?" People imagine it ought not to be so. I explain to them that a filling is not a talisman that will ward off all future decay, that it simply restores the contour of the tooth, and that the tooth has again to combat the influences that first produced the decay. Another thing that I have to continually impress upon the patients is that in pyorrhea, and where tartar accumulates around the teeth, it is far more important to fight this disease, which involves the stability of all the teeth, and stop its advancement than it is to fill a cavity in a tooth. They will bring up the question of filling this or that particular tooth in preference, while their teeth are neglected regarding this disease. We should endeavor to instruct them as to what pyorrhea is, and how necessary it is to arrest it by repeated cleaning of the teeth and treatment of the gums. Such matters we have always brought up in our practice, and if our patients were instructed on these few subjects alone, as they ought to be, it would aid us very materially in getting through with our work.

Dr. Benjamin Lord. This is a subject in which I feel more interest than I can express, for I am a poor talker. We know that there is a great deal of ignorance on the subject of the proper care of the teeth on the part of persons generally, and it would not be expected that the public would know much about their treatment when diseased.

It will generally be conceded, no doubt, that the dentists possess the information that the public needs, and the question has not infrequently been raised. How can the public be informed in regard to the teeth, in regard to their care, and the means that are required to be used for the thorough cleansing, on all sides, of each tooth? For herein consists the secret and groundwork of the prevention of their becoming diseased.

We hear many persons say that they can't understand why their teeth should decay, for they brush them two or three times a day, expecting that the brushing is the only thing that is required.

And we hear parents say to their children, when their teeth are

found to be decayed, "It is just what I expected, and it serves you right; you would not brush your teeth, as I have so often told you to do."

Now we know very well that the use of the brush has very little to do with preventing decay, for the reason that it does not come in contact with those surfaces that are most liable to caries, nor does it prevent decay where there are natural imperfections in the formation of the enamel.

The fact is the teeth are brushed too much. They are often injured by the brushing, and the gums as well as the teeth are also much injured by the brush.

The subject has been nicely brought to our attention by the essayist, and it ought not to stop here; it is a very proper question for a dental society to consider, and it is to be hoped, in one way or another, this discussion may be useful to the public; but whether the public can be reached and benefited through the press is a matter for grave consideration.

It is well known that the public at large is also very ignorant in regard to the proper care of the general health, and they get very little information on the subject from physicians or through the public press. It is only the care of the teeth as regards keeping them thoroughly clean, and a few facts about their treatment when diseased, that the public could understand. That being the case, the simple question is, How can such information be best imparted?

Perhaps something can be done through the press, if it is done very wisely, so as to avoid giving the impression of selfishness or self-seeking on the part of those who may make the effort.

It might be, and most probably would be, a better plan for every dentist to make it a business to improve every proper occasion to give as much information as possible on the subject of the teeth, in all its aspects and bearings, that would be understood and appreciated by their patients. In this way a great many thousands of all ages would be reached and instructed every year.

Dr. W. C. Barrett. If the ends sought by the essayist—and which certainly are to be desired—could be secured by the means proposed, I should most heartily commend the scheme. But of this I am exceedingly doubtful. I fear that greater harm than good might ensue. The press is certainly a powerful educator, when it is intelligently and honestly directed. A quarter of a century ago newspaper management was a different thing from that of to-day. The code of newspaper ethics was a strict one, and every editor was held to a severe moral accountability. Journals were conducted from the standpoint of the reader, and there was some attempt to verify the statements made.

At the present time, the typical daily journal is edited in the counting-house instead of the sanctum. It is merely a machine for the coining of money. Its literary character is entirely subordinated to its business interests. Its old and once well-won reputation as an educator of the masses has been deliberately sacrificed upon the altar of cupidity, and our secular journals are managed like any other business enterprise. The money gained enables the nominal editor or proprietor to hire men with plenty of literary ability, and to direct the product of their brains into a channel that shall bring yet more money.

Reporters now are usually smart young men, who work like other journeymen, by the piece, and whose pay is dependent upon the acceptance of their contributions. The editor wants something that is striking and readable. Sensational articles, that will go the rounds of the press, and thus spread the fame for smartness that the journal covets, are most sought. An epigrammatic lie is infinitely preferred to a prosy truth. If a reporter can take an actual fact as a basis upon which to weave a tissue of absurd but brilliant caricatures, he will never want for a position.

I am not railing against the press. We all fear, if we do not respect it, and I am but stating a simple condition. The present status of newspaper editing is entirely consistent when regarded from the present ethical standpoint. Managers of journals insist that they are under no more obligation to sacrifice their pecuniary interests to the public good, than is the proprietor of a manufactory or a corner grocery.

Look at the average report of our own professional meetings, as made by the newspaper reporter. They are too often but mere travesties. The smart reporter cannot resist the impulse, either openly to burlesque the proceedings or covertly to ridicule them, that he may spice his article and make it readable to the non-professional. In either case his object is to make the article readable, and to commend it to the public taste. The reporter, the editor, and the publisher are but catering to what they believe to be the taste of the average reader, but the result of it is to hold up to public derision a profession striving to win public favor.

To my apprehension, the essayist proposes to commence at the wrong end of the business. The public must be educated up to a perception of the truth, and to a demand for that which is not a mere parody. This is not to be done by prosy, educational articles, written by men who know all of dentistry but little of newspaper work. The average reader does not spend his time over paragraphs that have for their avowed object the stuffing of him with information. He reads for diversion, and not for investigation. You cannot get him to swallow a pill if it be not sugar-coated with some special attraction. The person we wish to reach does not read the scientific and professional journals, which alone can be depended upon to give the exact truth.

Neither are the newspapers anxious to publish such matter, or, publishing it, they are certain to send out with it something that will completely neutralize its force.

I challenge the truth of the statement that medical societies recognize the educational power of the press and are taking advantage of it. They have tried that to their sorrow. Under the guise of professional intelligence, the wily quack has ever been ready to furnish the press with any amount of information, all tending very delicately but unmistakably toward his own aggrandizement. Those who are members of medical societies know that the great aim of all reputable organizations of a professional character is to keep their members and the societies themselves out of the public press. They condemn in unmistakable terms the effort at medical education through the newspapers, as tending solely toward the benefit of the irregular and unworthy practitioner.

The scrutiny of a committee will not relieve the matter of these objectionable features. Some name must be appended to a contribution, or it must have some other substantial authority to attest its genuineness, and this at once taints the whole affair with the odor of advertising. If a communication which contains correct information be sent to the papers anonymously, how is it to be distinguished from the misinformation now furnished? If its legitimacy be acknowledged by a reputable name, the whole question of advertising is admitted, and the quack will immediately rush into print with columns of false intelligence a great deal more entertaining, by reason of a covert advertisement in the tail of it, and he will justify himself by the precedent already established.

If the name of a committee or that of a society be used, they are simply entering into competition with the charlatan in a business at which he is an adept, and they put themselves and their profession on his level in the public estimation at once. It should not be forgotten that the average reader is not informed on professional matters, and is ignorant of things which to us are elementary. He does not know who is professional authority and who is professionally anathema. So the name of some Reginald De Courcy, formerly Dentist Extraordinary to the King of the Cannibal Islands, carries much more weight to his mind than that of the worthiest professional man, while the former is a thousand times more likely to get into the newspapers with his smoothly worded personal puffs.

In view of these facts, I cannot but believe that the only dignified, professional, manly way is to continue within professional lines, keep out of the newspapers, and leave the advertising business to those who know more of it than we do; to diffuse information that is legitimate whenever we have the opportunity to do so in a place in which we know that it will be respected, and thus in time surely to build up a reputation that cannot be successfully attacked, and which will secure the respect even of the modern newspaper reporter.

Dr. Edward C. Kirk. The question of the better education of the people with reference to dental matters is one which has frequently been brought forward, both before dental associations and from time to time in the dental periodicals. The lack of a proper popular appreciation of the importance of systematic and intelligent care of the teeth, and the prevalence of many erroneous beliefs respecting their care, is a condition of things constantly brought to the notice of every dental practitioner. The generally acknowledged need for popular instruction in dentistry has brought out numerous suggestions from members of the profession looking toward improvement in this direction, and various means have been indicated whereby the public may be reached in a manner which would be entirely consistent with recognized professional ethics, and at the same time satisfactorily accomplish the object.

An important paper on this subject by Dr. B. S. Scott, of Ellensburg, Washington, published in the DENTAL COSMOS for February, 1892, entitled "Dentist, Doctor, Teacher," is a strong plea for popular dental instruction, and suggests several channels through which the public may be properly reached. Among these he calls attention to a most important avenue, viz, in the public schools, by the insertion in the text-books on physiology there used well-written chapters on

the teeth, their conditions of health and disease, and the methods for their protection. The instruction of those who are to become professional school-teachers should include a fundamental training in the hygiene of the mouth and teeth, as well as the more salient features of their anatomy and physiology, and the imparting of such knowledge to their pupils be made an obligatory portion of their work.

The suggestion embodied in the paper of Dr. Warner, it seems to me, is one of great importance, and one well worthy of careful consideration at this time. Its importance, to my mind, lies not so much in the matter of its proposed utilization of the public press as a medium for reaching the dental laity, for this has been frequently suggested before and in some instances tried, and, for reasons which will be referred to later, has usually resulted in more harm than good, but its value grows out of the practical and common-sense conditions with which he surrounds his suggestion as safeguards, and which, so far as I understand them, are amply sufficient to prevent any misuse of the proposed method whereby it can be diverted to personal ends. The willingness of the public press to give space and prominence to matter of this character is generally conceded, as there is always a ready acceptance accorded to all properly written articles having a popular educational tendency. Sporadic attempts at popular dental education occasionally meet the eye in the public papers, but as a rule they fall short of the mark, either because they are not intelligently written from the standpoint of the best that is at present known on the subject, or they convey the impression of having been written by an extremist in a self-laudatory spirit savoring of the quack advertisement.

The plan which has been proposed for the consideration of this body by Dr. Warner, if I understand him correctly, is to place this work in the hands of a committee of competent members of this society, who shall prepare a systematic series of articles for the education of the public on such dental matters as it is desirable that they should be reliably informed upon, and that these articles after due consideration shall be presented to the public through the medium of the public press. To the proposition as outlined I desire to give my unqualified approval as an individual and as a member of this society. I can see no reason whatever, on the grounds of professional ethics, why it should not be done, and every reason why it should be, in view of the great importance of the work to be accomplished in the matter of benefit which must necessarily result from it, both for the dental profession and the public, if undertaken in a broad educational and philanthropic spirit.

Dr. Warner. In support of my statement regarding the medical profession, I have a number of articles that I have taken from the New York *Herald* from time to time, written over nobody's signature, on a widely different number of subjects, intended for the benefit of the public at large. I have them here. For instance, "Medical Information for Lay Readers," no name attached, although it is an entire column. "New Remedies Tried by Doctors," "Forms of Treatment to Check Cholera," "What the Doctors are Doing and Saying," all appeared in the same paper. When the late cholera scare was upon us, there was plenty of advice in the press upon the subject, and the principal advice was to call in a physician immediately. The principal idea I want to bring forward is to dispense

knowledge. The decay of the teeth is as epidemical as a disease, and the public ought to be instructed as to the necessity of visiting a dentist. There is no need of going into any scientific discussion; there is no use of informing them about dental anatomy; simply give plain advice, such as, for toothache, they must not go to a drug-store and depend upon self-applied remedies, but call at once on a good dentist.

Dr. K. C. Gibson. Has Dr. Warner any reason to believe that these articles emanated from medical societies? That is a point that I would like to know. These articles do not come from medical societies; they may come from members, and I do not believe they are sanctioned by the societies.

Dr. Warner. I find the information I received regarding medical societies was erroneous to a certain extent, and originated from the fact that the county medical society has had this question under consideration for some time, but has not as yet taken any active measures.

The *Herald* articles are copied from the European edition, and the editor will not state whether they emanate from a medical society abroad or not. As the articles treat of exposures of quack medicines, and of important matters before the Academie de Medicine, Paris, there is sufficient evidence in them that the medical profession indorses the kind of work I advocate.

Adjourned.

B. C. NASH, *Secretary*.

CALIFORNIA STATE DENTAL ASSOCIATION.

At the annual session of the California State Dental Association, held at San Francisco, July 19, 1892, Dr. J. M. Whitney, of Honolulu, presented a paper entitled "Relation of the Food to the Teeth of the Past and Present Races of the Hawaiian People," which is printed in full at page 4 of the current number. Following is the discussion on the paper:

Dr. W. X. Sudduth. These specimens are unusually interesting as illustrating the degeneracy of the Hawaiian race. It is a treat to this society to have the opportunity to see some of the results of Dr. Whitney's labors there for many years in the collection of these skulls, from which he has sent on these typical specimens.

We have a comparison here between the older skulls and the later Hawaiian. The two larger, heavier skulls are from the lava cave, and the two smaller skulls, of thinner, lighter bone, are from the sand beach burial-ground, which is of later origin than the lava burial-grounds. You notice the difference in weight, and also other things that indicate a marked difference between them. Now, if Dr. Whitney's theory is correct, that the chiefs only were buried in the lava caves, that might account for it, because the chiefs might have been selected on account of their size. The larger skulls evidently represent a much more massive race in development than do the later burials. There is one skull here in which there was ankylosis of the temporo-maxillary articulation of the right side. Whether it was complete or only partial I cannot say, but it is a very interesting specimen. I have studied it as much as I had time to in the last twenty-

four hours since it was given to me, to see if I could make out anything in connection with it. Of course there is no history in regard to the specimen, other than the location in which it was found. Ankylosis of the right side was partial or complete. A point to be noticed is that abrasion of the teeth has occurred altogether on the side opposite to the ankylosis, and the buccal faces of the superior molars on the side of the ankylosis are very little worn, which indicates that the possessor had had considerable use of the jaw, because all the abrasion on the left side has resulted since the ankylosis took place, else we would find the buccal faces of the molar teeth of the right side worn down equal to those of the left. Then we find on the side opposite to the ankylosis quite a large edentulous space, which, had it occurred in a case of ankylosis treated by modern surgery, we would say the teeth had been extracted in order to allow the patient an opportunity to take liquid food. There is, however, nothing to indicate that such has been the case in this instance. But the decay of the left inferior wisdom-tooth and the loss of the second inferior molar, where absorption had already taken place, shows that that condition had existed there for a considerable length of time. In the upper denture the loss of the second and the absence of the third molar, and the appearance of the superior maxilla, also indicate that the condition had existed for a considerable time. Your president has offered the suggestion that the individual had received a blow on the left side of the jaw, knocking out these two teeth, and that the concussion resulted in ankylosis of the articulation of the opposite side. That might possibly be the explanation. There is one peculiar feature that I want to call your attention to: the alveolar process to the second and third superior molars is almost absent, and the bone is smooth there, showing that it has been gone for quite a length of time, which might indicate that the teeth had been knocked out from the inside to give him an opportunity to take food. But I think that the explanation will be found rather in caries, because we have the third inferior molar coming at right angles almost to the other teeth; and the ankylosis on the opposite side making it possible to eat only on the left side, the loss of these teeth would indicate that food had lodged around them, and that the irregularity of the teeth there formed a pocket for the lodgment of food, and decay resulted in the loss of the teeth. That seems to be the most sensible and reasonable explanation of the loss of these teeth.

The other large specimen from the cave burial-place is interesting on several accounts. It shows a very strong muscular development. The anterior teeth have that underhung appearance that only comes with strong muscles. The absence of the third molars is very interesting indeed. That point Dr. Whitney called attention to. It would be interesting to cut down and see just what position these teeth occupy.

I have at home a skull said to be a Hawaiian skull, that was taken from the base of a cliff not very far from Honolulu. It had quite an interesting history connected with it,—whether authentic or not I don't know, but it is said to be authentic. King Kamehameha, who reigned over the latter half of the eighteenth century and the first quarter of the nineteenth, united a number of islands that were all separate kingdoms and had separate rulers. He succeeded in uniting

a number of tribes and subduing all the rest, somewhere about the beginning of the nineteenth century. Previous to that he drove a large band of warriors up the rising ground to the top of this precipice, which overlooks the sea below, and they, knowing what death would await them if they were captured, threw themselves over the precipice, some eight or nine hundred feet. Their bones lay bleaching on the sand until they were covered up. Large numbers of skulls from that burial-ground have been collected. There was one dealer who had twenty-eight of them. Out of those I selected a skull which was nearly as large and as massive as these skulls are. In it there was an absence of the inferior third molar, and the superior third molars were turned, standing outwardly,—as marked a case of irregularity of the third molars as I ever saw. I had never heard the explanation that Dr. Whitney has given us regarding the later burials on the beach, and it is possible that his theory of that may be correct. This legend that comes in regard to the skull I think is correct also. It is told as a matter of history, about these men being driven over this precipice, and these skulls were collected from the base of that cliff. If so, then these larger skulls and the skull I possess represent the primitive and native Hawaiians, and I think it is highly probable. I am very happy indeed to see that Dr. Whitney has confirmed my own explanation and theory in regard to the dental irregularity of these primitive races, because I take but little stock in the theory that the inferior third molar is rapidly disappearing. I see no reason in the examination of the skulls of all races of people (and I have given considerable attention to it) to justify that belief.

The degeneracy of the teeth that Dr. Whitney points out is beyond question true. The teeth are degenerating, but it is the matter of environment, habit, and heredity, that is altering teeth so markedly.

There is another specimen here, from one of the later burial-grounds, that shows a fistulous opening through the bone into the antrum of Highmore. This was of long standing, because you can see that the bone all around has become rounded and smoothed out. It must have been existing for a considerable length of time. Another specimen which is sent here showed the presence of alveolar abscess in the jaws, a well-marked case, and the loss of bone indicates that these people suffered from dental troubles, although, as Dr. Whitney says, not as extensively as do their grandchildren.

There are one or two points in regard to the scientific aspect of this question. Dr. Whitney is evidently wrong in his inference regarding the action of meat-fibers causing decay. He notes among the causes of decay, uncleanly habits and the retention of meats, raw and cooked, between the teeth. The fermenting of meat will not produce decay. Putrefaction will not produce decay. Putrefactive changes of meat will not produce decay. You can only have decay of the teeth, as we understand the term "decay," by the action of one acid, and that is lactic acid. I have given a great deal of attention to the food habits of different races in connection with the prevalence of decay of teeth of those people, noting how change of diet will affect the quality of teeth. Now, this change in the quality of the teeth depends upon three things. In the first place, it is a matter of heredity; I mean inherited disease. Take the prevalence of syphilis where it has been first introduced into a race, follow down the

history of the teeth of those people, and you will find that the children and grandchildren inherit a softened condition of the teeth; you will find a lack of lime-salts in the bone and also in the teeth. The teeth of individuals whose parents or grandparents have suffered from syphilis are very poor in quality. In studying the effect of syphilis upon different people, we have through heredity the deteriorated condition of the general health reflected in the retarded development of the teeth. There is a lack of assimilation on the part of the individual, and it is shown in the teeth just as it is in the bone. It is this condition which we call rachitis.

Another thing that affects the teeth is a change in food habits. Among carnivorous animals, those that eat meat almost entirely, decay is almost unknown. Take the dog, for instance, as a typical example of the carnivorous animal. The character of food that a dog eats is self-cleansing. The teeth are clean and white. This food, if it remains in the mouth and ferments, will not produce decay. But take a petted dog, poodles and other dogs fed on dainties and bonbons, and you will see pyorrhea alveolaris and decay in the teeth of those dogs constantly. If that is so in regard to the teeth of the animal, it is doubly so in regard to the teeth of men. To those people that live on a purely meat diet, like the North American Indians in early days and the Esquimaux down to the present time, decay was almost unknown. You may examine the skulls of the primitive races of the Indians of North America, and decay is almost unknown. When they are put under the same environment as Europeans and Americans, decay becomes more and more apparent. Change of diet, then, is one of the things that tend to produce decay.

Now, how does this affect the teeth? To go into the chemistry of food will take too much time, but I can give one or two points in regard to it that will be interesting, perhaps. Take one of the facts mentioned by Dr. Whitney, the food that these native Hawaiians live upon. There was very little starch-bearing food (especially in the way they use it) eaten by the native Hawaiians in the olden time, when they were in their uncivilized state. Even this *poi*, which is a very delectable dish, I understand from those who have seen it made, is prepared in such a way, that while it is made from a starch-producing tuber, it does not produce lactic acid in the mouth. They cook it, steam it, pound it, and then leave it to sour. The result is that the starch is converted by fermentation into glucose, and further fermentation goes on in it, producing lactic acid before it is taken into the mouth. Now, we know that acid foods that are acid when taken into the mouth never produce decay. They produce erosion of the teeth. Take the grape-cures once used so extensively in Europe, where we have fruit acid, and the use of mineral acid; they do not produce decay, they produce erosion. They roughen the surface of the teeth, and they are more easily abraded in the process of mastication, so that the teeth wear down quicker. But unless there is taken into the mouth the starch itself, or the glucose itself, through the agency of which fermentation takes place in the mouth, decay is not produced. You see that in the principal portion of their diet, which is *poi*, the acid would exist before it is eaten. If they were eating the product as we do flour and things of that kind, they would have starch taken into the mouth, which would then be converted into a grape-sugar and

then into lactic acid. This is the case in regard to the diet of the original Hawaiians ; but, as Dr. Whitney says, through the importing of wheat flour from California, I presume they have learned to make and eat that diet we call cake. It is largely made up of gluten, is sticky, and adheres to the teeth, fermenting in the mouth, where it forms lactic acid. It is converted first into grape-sugar and then into lactic acid, and decay, of course, is the result. Now, the history of all people is that when they come within the range of civilization, and are dependent upon a starch food, decay is more prevalent than it was before. I don't know whether on this western coast you notice it as much as we do on the eastern coast, but it is very common in the east with the servant girls who come from Europe, that after they have been in this country six months or so their teeth begin to decay. It has nothing to do with the change of condition other than as it is affected by the change of diet. A large proportion of the servant girls who come to America from Sweden, Norway, Germany, and Ireland come from the farms. They go into the kitchens of our American homes, and there their diet is changed from their former coarse food, which is not starchy and sticky, to the food as it is prepared in American homes. They change to that from a diet which is nutritious and self-cleansing. The result you see very quickly. Decay sets in and the teeth are broken down. It is a change in diet due to the change in environment and condition. If they developed the same habits of cleanliness that American children are brought up with, and kept their teeth clean, they would not have as much decay ; but a tooth-brush among the peasants of Europe is an unknown quantity, and they lose their teeth, in this country, before they learn what a tooth-brush is for. So you see it is the conditions which they are brought under, which they are not educated up to, that result in the loss of their teeth.

Fermentation is constant in the mouth whenever starch is present. We want to distinguish between erosion and decay. Erosion may be caused by general acidity of the saliva ; but decay, as we understand it, is the result of fermentation.

Dr. Mories. I would like to mention a case I had which illustrates what Professor Sudduth has just said about diet. I have been working for a German family of children. I find their teeth decay quite as much as the children of American families. I have made a study, to a certain extent, of the cause of this decay. The mother came with the children. I asked her what was the reason? She said she could not account for it, because the diet was just the same as the children were brought up on in Germany. She said they were never allowed any candy, and they used the same black bread as they used in Germany, the same diet exactly, but the teeth decayed just the same as children here of American parents. So in every case it cannot be the diet.

Dr. B. R. Jacobs. I have listened to the remarks of Dr. Sudduth with a great deal of interest. But when he was talking of the vast difference between the decay of the teeth of American people and those of European people, also coupled with the statement that the meat diet of carnivorous animals was one of the reasons why their teeth did not decay, it occurred to me that there are no civilized people in the world, I believe, that use as much meat as the American people.

This is well known among foreigners that come to this country. It doesn't come under our observation so much; but if you talk with foreigners, people who come from Germany or any other part of Europe, you will find that in their native homes they use very little meat. If so, they must eat something else. Certainly their food does not consist entirely of meat, and it must consist principally of starchy food, the very food that according to the theory of Dr. Sudduth would mostly cause decay. Now, it is a fact pretty generally known that the teeth of foreigners do not decay as rapidly as ours, and that the teeth of savages do not decay as rapidly. It seems to me that the main difference in that respect is in the matter of articulation of the teeth. I have noticed for years, and I believe you will find that when the articulation is perfect, as it is in the jaws here exhibited, decay is very rarely seen. Professor Cobb, some years ago, in a published paper stated that slight shocks, if not too severe, had the effect of hardening the tissue. I believe that the same thing might apply in regard to slight shocks such as the teeth would get when the articulation is perfect. That would be one cause or reason for the absence of decay in the teeth of savages. When the jaws are large the teeth are strong, and the muscles of the jaws are large, as in savages, where they have to depend upon raw food that must be masticated by considerable exertion; the effect is to develop the teeth and to cause an extra deposit of lime. The continued effect of that alone would be sufficient to prevent decay in the teeth.

There is no doubt that lactic acid will produce carious teeth, but I can't see any reason why one acid that will dissolve lime-salts will not produce carious teeth as well as another. It is, in my opinion, simply the action of the acid upon the teeth that is the immediate cause of carious teeth; and the locality of the carious teeth would be determined by the thinness of the enamel. Take, for instance, in the crevices of the molars at places where approximal cavities occur, where the fluids of the mouth would be held, there is where caries would commence, where the action of the acid would be the most continuous.

Now, in the use of meats, of course, I have no reason to believe that meat itself will produce acid that will produce decay of the teeth; but I can see no reason why any other acid—acetic acid or any of the acids—would not have the effect of producing carious teeth as well as lactic acid. Why is it that the effect of lactic acid should be local at one particular spot in the teeth, and not at another part? Dr. Miller wrote a great deal on that subject, but he never pointed out that particular thing,—why it was that lactic acid would produce decay, and why the others did not.

Dr. L. Van Orden. In regard to the question of irregularity in its relationship to decay, it occurred to me while Dr. Sudduth was speaking that I have had two or three marked cases which would confirm his opinion. I think that Dr. Davenport called attention to this matter; and Dr. Dean, of San Francisco, lately brought to our notice the fact that the better class of teeth, the better articulations, were always very square and firm, with a close adaptation of the teeth to each other.

Dr. J. P. Parker. There is one thing we all observe, I think: that proper mastication of the food, good healthy exercise of the teeth, is

always conducive to the health of the teeth. Those animals which are carnivorous usually partake of their food raw. They eat meat entirely. They are given also to gnawing their meat close to the bone. They no doubt get those healthy shocks from the operation which Dr. Jacobs spoke about. But I think we will find, in studying the teeth of animals that are not carnivorous, such as squirrels and those that do eat starchy food, that they also have very healthy, clean, well-polished teeth.

I have had some experience with the teeth of foreigners as alluded to. I have studied that point considerably. I find, usually, that foreigners coming into this country do not quickly fall into a fortune so that they can indulge in luxuries, and consequently they have to confine themselves to black bread and the food they have been accustomed to, at least for the first few years in this country. But decay occurs. Then there is another kind of immigrant that I might mention,—that is, people coming from the eastern states to the Pacific states. I have observed that for the first two years of their life here they usually have an increased decay of the teeth. I notice it quite markedly, almost as much so as I used to find in the east in the case of foreigners. I do not mean to say that change of climate necessarily causes decay of the teeth. I cannot give a solution of it, but I state the fact.

Dr. W. Z. King. It has been suggested that a change of climate, a change from the northern and eastern states to California, was the cause of a good deal of decay. As you all know, the water that we drink here is soft. I think it is so all over California. It is wherever I have been. In the western states they have hard water with lots of lime in it.

Dr. L. B. Holmes. While we all recognize the influence of diet on the teeth, there is a great difference in the teeth themselves. You will find teeth that you can almost pick to pieces with your thumb-nail, and others so hard you can hardly find an instrument that will cut them. In children born of parents with teeth of the character first mentioned, I think it would be almost impossible, on any diet, to make good teeth. I have a family in view just now. Several of them have worked for me in my business. I have seen six of the children. They eat everything. Their teeth seem to be perfect. One of them, I think, is nearly forty years old. The articulation that has been shown here is characteristic of the whole family. Their teeth are close together, very massive, and the enamel over the crowns of the teeth is perfectly united. Now, we find in a great many cases decay of the teeth is caused not so much by diet as by imperfect union of the enamel. We all know that the enamel commences from each cusp and unites in the center. In cases in which this union was imperfect I think that any diet that might be used, with perfect cleanliness after each meal, would fail to preserve the teeth from decay.

With reference to some of these skulls being so much thinner than the others, you will also notice how much smoother they are polished. Dr. Whitney says the bones are polished like ivory. Would you not attribute that condition somewhat to the action of the shifting sand in which they were buried? You will find that even over the sutures it is as smooth almost as if you had rubbed it over with sand-paper.

Dr. Sudduth. A point was made with regard to the healthy shock in well-articulated teeth. I would call the attention of the gentlemen to the fact that the teeth are perfectly developed before they get that healthy shock, that there is no change in the character of the teeth, and it is very little affected by use. The teeth are developed in their sockets, and the crowns come through fully erupted, more perfect at that time than at any other.

Dr. Jacobs. Do you mean to say that the calcification is just as strong before that?

Dr. Sudduth. In what part of the teeth?

Dr. Jacobs. In all parts of the teeth.

Dr. Sudduth. Name one part.

Dr. Jacobs. The dentine.

Dr. Sudduth. I will say that the dentine is modified somewhat. But the dentine does not constitute that part of the tooth that is first affected by decay. It is the enamel. The enamel at the time the tooth erupts is just as perfect, just as fully calcified as it ever will be, because it is developed from the epiblastic layer that lies outside of the teeth.

AMERICAN DENTAL ASSOCIATION.

(Continued from page 1014, vol. xxxiv.)

THIRD DAY—*Morning Session.*

THE association was called to order at 9.15 o'clock, the president, Dr. Walker, in the chair.

Section III was again taken up and passed.

Section IV, Histology and Microscopy, was called, and there being no response, was passed temporarily.

Section V, Materia Medica and Therapeutics, was called, and Dr. A. W. Harlan, the chairman, made a brief verbal report announcing two papers, one by the secretary of the section, Dr. G. E. Hunt, and the other by the chairman.

Dr. Geo. Edwin Hunt, Indianapolis, Ind., read a paper entitled "Dental Therapeutics."

Dr. Hunt's paper considered especially the subjects of anesthesia and antisepsis. It gave a *résumé* of the properties of pentol and ethyl chlorid, the former as a general and the latter as a local anesthetic, in accordance with the late literature of the subject, referring to the experiments by Dr. H. C. Wood (see DENTAL COSMOS for July, 1892), in view of which it said it would be well to use pentol with great caution until its physiological effects are more definitely determined.

Of the ethyl chlorid, the paper said it had proved itself a local obtundent of considerable worth, being admirably adapted for minor surgical operations. The same course of experiments previously referred to indicated that it would be a dangerous general anesthetic and one difficult of administration, owing to its extreme fugaciousness.

The credit of first calling the attention of dentists to aristol was given to Dr. W. H. Whitslar. It may be used with chloro-percha for root-canal fillings, and dissolved in chloroform, sixty grains to the half-ounce, it makes a dressing for root-canals, or as a protective and antiseptic over excoriations of the skin. The powder may be dusted on

gangrenous pulps with a fine brush. An excellent root-canal dressing may also be made by rubbing up a grain of aristol in ten or twelve minims of one of the essential oils, to which may be added two or three drops of ether or chloroform. Small rods, composed of cacao-butter and aristol in the proportion of ten to one, are recommended for use in fistulous tracts. Aristol should be kept in well-stoppered, dark-colored bottles, and bought in small quantities, as it deteriorates on exposure to light and air.

The use of nitrate of silver for the arrest of decay has received additional attention through the experiments of Dr. E. A. Stebbins. In the deciduous teeth, or in the adult molars where imperfection in the formation of the enamel has resulted in superficial decay, it may be employed advantageously. In approximal decay of the anterior deciduous teeth a thorough application in a saucer-shaped cavity cut into comparatively good tooth-substance will prevent recurrence. The ease of application and the subsequent freedom from decay more than counterbalance the objection made on account of the blackness of the cavity it causes.

The paper concluded with an abstract of a thesis by Chas. T. McClintock, A.M., assistant to the professor of hygiene in the University of Michigan, entitled "Corrosive Sublimate as a Germicide," the conclusions arrived at by its writer being so opposed to all past teachings that it was offered without comment. The author finds, after making some hundreds of experiments, that Koch, in recommending corrosive sublimate as the most effective of all known substances for disinfecting purposes, and those who have confirmed Koch's work, based their conclusions on faulty experiments. The most important fault on the part of Koch and his followers was their failure to notice that the sublimate formed with the gelatinous coat of bacteria a compound insoluble in water, but soluble in salines and readily removed by the blood. When bacteria treated with sublimate were transferred to gelatin or agar, the capsule of mercury compound prevented the growth of the germ, and the false conclusion was drawn that it was dead. In the author's experiments this capsule of mercury was removed by precipitation with hydrogen sulfid. While Koch states that all bacteria are killed in a few minutes by solutions of sublimate 1-1000, these later experiments show that bacteria such as *Staphylococcus pyogenes aureus* may grow after immersion for ninety-three hours in the 1-1000 solution, eleven hours in 1-100, and one hour in a saturated solution. *Bacillus subtilis* grew after lying in 1-1000 forty-one hours, saturated solution eighty-five minutes; typhoid germs in 1-1000, one hour; germs in feces after twenty-four hours in a saturated solution. Several experiments indicated that strong vinegar and 1-1000 sublimate had about the same germicidal power.

The conclusions drawn from the experiments described in the thesis are: 1. That the high rank heretofore given corrosive sublimate as a germicide is without warrant, and was based on faulty experiments. 2. That different cultures of the same germ may vary largely in their resistance to germicidal agents. 3. That corrosive sublimate forms with cellulose, with silk, with albuminous bodies, and with some parts of bacteria a compound which cannot be removed without washing. It forms a capsule around germs, which protects them against its further action and prevents their growth until

removed. The capsule may be removed by the solutions, as in the blood. The action of sublimate on bacteria is probably analogous to that of alcohol, etc. 4. That the presence of the gelatinous envelope in many, if not all, bacteria has not received due attention. 5. That in albuminous fluids corrosive sublimate of any strength whatever is not a reliable germicide. 6. That while sublimate has no great germicidal powers, it does not follow that it may not be a valuable disinfectant. This remains to be proved.

The report concluded by calling attention to the fact that Laplace has described the coagulating influence of bichlorid of mercury on albumen, and demonstrated that acidulating the solution with hydrochloric, tartaric, or carbolic acid avoided coagulation.

Dr. A. W. Harlan, Chicago, read a paper entitled "Europhen, Trichloracetic Acid, and Syrup of Iron Chlorid."

Dr. Harlan quoted from F. Goldman a description of the process of making europhen, which is obtained by the action of isobutyl-alcohol upon *o*-cresol in the presence of chlorid of zinc at an elevated temperature, producing isobutylcresol. This is then acted upon by iodine in potassium iodid, the resulting iodine compound being isobutylorthocresoliodid, or europhen, an amorphous yellow precipitate, which, separated by filtration and cleansed by washing, is dried, with exclusion of light, at an ordinary temperature. The percentage of iodine is about 27.6, which corresponds accurately with a proportion of one atom of iodine to two molecules of isobutylcresol. It is resinous to the touch, and adheres tenaciously to the mucous membrane, to wounds, and to the unbroken skin. It has a specific aromatic odor, which vanishes almost completely in a mixture or solution. It is insoluble in glycerol (glycerin) or water, but easily soluble in alcohol (thirty per cent.), ether, or chloroform (equal weight), and such compounds of these as collodion and traumaticine, or liq. gutta-perchæ, and in the fatty oils. By rubbing at a low temperature, a twenty-five per cent. solution in olive oil is readily produced, which should be filtered, as it then remains clear a long time. A small precipitate, which forms in all the above-mentioned solutions, consists of an organic iodine compound, soluble in water, but insoluble in the menstrua named. The supposition appears justifiable that europhen in contact with water (wound secretions) gives off slowly small quantities of iodine, which are immediately combined again, and thereby form the soluble compound. Perhaps the chief part of the action of europhen is to be ascribed to this formation in the nascent state. There must, therefore, be present in europhen extremely small quantities of free iodine, which form during the drying and cannot be removed from the product. The percentage has been computed at about 0.03 per cent.

Europhen is easily decomposable, and certain precautions must be taken in applying it. Mixtures which contain starch, as for example zinc amyllum paste, are to be avoided, as also mixtures with metallic oxids. For a thick paste talcum may be used. Simple mixtures with fats, vaselin, or lanolin, are very durable, the latter being especially to be commended, as it takes up a large quantity of water and favors a continuous formation of the soluble iodine compound. All solutions should be prepared at a low temperature. Europhen must also be protected from the light and kept in a dry place.

Europhen is five times lighter than iodoform, for which it is proposed as a substitute ; so that a given weight of the former will cover five times as large a wound-surface as the same weight of iodoform. Fine iodoform-powder cakes easily, which does not occur with europhen. The two substances have the same influence upon bacteria, namely, neither destroys the micro-organisms, but both make the medium unsuitable for their growth, the action being chemical in its nature. Europhen not infrequently proves efficacious in cases where iodoform has been refractory. Europhen has also the advantage over iodoform of a relative freedom from odor and the absence of toxic effects.

Passing to the consideration of the uses of europhen in dentistry, Dr. Harlan had found that when applied in powder to gingival inflammations produced by the setting of crowns and bridges it promptly and efficiently reduces the swelling and soreness, and is equally efficacious in mucous patches on the cheek or tongue of syphilitic origin. Applied to a suppurating or inflamed pulp, it quickly subdues the pain. He uses it in powder rubbed up with lanolin, twenty-five parts of europhen to seventy-five parts of lanolin. He had also found this paste useful in excoriations around the corners of the mouth and nose, in inflamed sore mouth under metallic or rubber plates, and as an after-dressing for pyorrhea pockets. He earnestly commended europhen as a parasiticide, and he thought it possible it might be useful as a dressing in empyema of the antrum, though he had not used it for that purpose.

Of trichloroacetic acid ($C_2HCl_3O_2$) the report, after briefly recounting the well-known method of manufacture by the oxidation of hydrate of chloral by means of nitric acid, described it as consisting of colorless, rhombic, deliquescent crystals, easily soluble in water or alcohol, and as being a powerful caustic, quickly destroying the epidermis or mucous membrane. Diluted with water to three per cent., it is an excellent astringent and stimulant. It is submitted as an agent of undoubted value in dental therapeutics for its solvent effect on calculi on the roots of teeth ; its destructive effect on pus-secreting surfaces of the sockets of teeth ; as an astringent and stimulant ; its energetic caustic action on morbid growths, epulis, excrescences on the pulps of teeth, and overhanging gum on third molars ; and as a refrigerant mouth-wash in one-half to one per cent. solution.

When an efficient tonic preparation of iron is to be taken by a patient, the elegant formula of Dr. G. W. Weld, known as syrup of iron chlorid, is to be preferred to the pharmacopœial preparation, as it is not injurious to the teeth, and dentists should therefore insist upon its use. The dose is one tablespoonful diluted with three times its volume of cold water. It acts as a diuretic, and has no equal as a prompt remedial agent in many cases of anemia, erysipelas, diphtheria, and neuralgia.

Dr. Frank Abbott, New York, was both surprised and astonished. He was astonished that Koch should have made such a mistake, and that so many who have followed after him should have made the same mistake for so many years in using bichlorid of mercury as an antiseptic. Every year a prop is knocked out from under the old appliances. Soon we shall have nothing left to destroy germs with, and the destruction which they cause will go unchecked. If there is any-

thing under heaven that will kill bacteria, it is bichlorid of mercury. It will destroy animal life, and by analogy it will kill bacteria. Some of us who have used it in our practice have had results which seemed to be satisfactory, and we have therefore come to rely upon it to a great extent for this purpose. Surgeons also rely upon it, and use it for the destruction of all kinds of germ life. If these things are true, there must have been a mistake by these last experimenters, which is very easy, considering that the difference of a hair's-breadth in some parts of the experiment might carry one entirely away from the proper course, so that we had better continue our use of bichlorid until there is more positive evidence against its usefulness.

One material, of which nothing was said, should have been mentioned in the report. In the speaker's practice, nothing can take the place of chlorid of zinc in the treatment of pyorrhea alveolaris, and more especially of alveolar abscess. It is escharotic and antiseptic and astringent. It does not muss up things, and for these reasons it is better than sulfuric acid in cases of this character. The agent referred to by Dr. Harlan as a useful antiseptic for the treatment of diseases about the mouth, the speaker knows nothing about; but he judges that it is excellent, and should be in the hands of all who have anything to do with mechanical dentistry. In reference to the preparation of iron suggested by Dr. Weld, it is claimed that it is not acid and will not affect the teeth. One thing about it, if allowed to stand a week or so, there will be a deposit containing iron. He thought, however, that this difficulty had been overcome. If it had been, this preparation of Dr. Weld's was invaluable, because if there is anything which has been administered as a medicine which has done damage to the teeth of the human race, it is the tincture of the chlorid of iron. Its resuscitative properties in debilitated conditions are something wonderful, and if a preparation can be devised which retains these and gets rid of the deleterious qualities, it is a great thing to have accomplished.

Dr. John S. Marshall, Chicago. Dr. Abbott said that almost all surgeons relied on the bichlorid of mercury as their principal antiseptic. That is a broad statement. There are a good many surgeons who to-day only use sterilized water, especially in the performance of abdominal sections. One eminent surgeon in Chicago uses nothing else in all his operations. His instruments are boiled before an operation, his own hands are thoroughly washed with soap and sterilized water, the parts are washed with soap and water, and then again with sterilized water, the sponges are all boiled and wrung out of sterilized water, the irrigator is charged with sterilized water, and even the stitches put in the wound also. The speaker had seen a great many operations under this antiseptic, and better results were achieved than by many others with the use of bichlorid of mercury.

With regard to pental, he had never personally used the agent, but just before leaving home he had come across a report from Professor Gurlt, chairman of the Committee on Antiseptics of the German Surgical Congress, who gave a report of 109,230 cases of narcoses with various agents, in which 39 proved fatal. Of these, chloroform was used in 94,123, with 36 deaths, one to 2614. Out of 8432 cases with ether, there was one death, a somewhat better percentage than that usually received, one in 5000. There were 2891 cases of anesthesia with chloroform and ether, with one death; 1380 cases of ether and alcohol

combined, with one death ; 2179 with bromo-ethyl, with no death ; and 217 cases in which pental was used, with one death. Although one swallow does not make a summer, the facts teach that we should use pental with caution.

Dr. Francis Peabody, Louisville, Ky., said that no other subject in our profession had so much interest for him as that of this section. By medical men dentists are largely considered mechanics, because they believe our knowledge of therapeutics is limited. We have too many agents. New discoveries are made every year, and the old remedies are at once laid aside. In probably fifty per cent. of the cases where new remedial agents are tried, the failures are of the most disheartening character. We of course want new agents that will give better results than those which we have in use, and we are constantly in search of them, and we look to those who are competent in chemistry to make investigations and discoveries in this direction, but occasionally one who is not so qualified stumbles on a remedy which produces results as good as any others. For himself, he could hardly see why old and tried remedies should be thrown aside. Carbolic acid and creasote used in their proper places, which are well known, produce good results, and yet they are ignored by many practitioners. One gentleman uses carbolic acid, but has no use for creasote. Another uses creasote, and does not use carbolic acid. Iodoform has been used extensively in the dental profession for some time ; indeed, some dentists depend upon it almost entirely with the aid of some of the oils, while others will have nothing to do with it. He had brought with him a sample instrument for the exhibition of iodoform in abscessed teeth after an improved method. It consists of a metallic tube passing through a cylinder, the tube being closed in the center and perforated on each side of the closure for the passage of gases. At one end of the tube is a rubber bulb, at the other a syringe point. The crystals of iodoform are placed in the cylinder, which is heated over the flame of an alcohol lamp until the iodoform is fused, when pressure upon the bulb will cause the vapor to pass through the syringe point. The bulb is then placed in the hand of the patient or of an assistant, and the syringe point inserted into the pulp-cavity or root-canal of the tooth, and the vapor forced into the canal. The results of this use have been wonderful. The fusing of the iodoform eliminates iodine, which passes into the tissues and produces thorough disinfection.

Iodoform is not usually considered an antiseptic by physicians and surgeons, and some even claim that it is not a disinfectant ; but there is no doubt that in the form of vapor, as here referred to, it does control septic conditions. When applied with this instrument under pressure, the vapor traverses every portion of the canal, even into the tubuli, and disinfects the tooth and abates the inflammatory condition. It will penetrate every sinuosity of the canal and every crevice of the canaliculi, and leave a slight deposit of the iodine wherever it goes. As illustrating the action, the speaker passed around a tooth which had been treated in the manner described, and he related instances of teeth which were loose and which under this treatment were restored to their normal condition in six weeks' time. In the Louisville College of Dentistry some six hundred cases have been treated in this manner, and so far as known but two of them have been

failures. The process has been in use for three years, and the gentleman who introduced it says he has had no failures in his practice. Iodoform is objectionable on account of its odor, as every one knows, but an even greater objection is the corrosion of the instruments which it causes. Instruments exposed to its action will become covered in twenty-four hours with a film of iodid of iron, which must be removed promptly, or the instruments will shortly become rusted. For this reason he does not believe iodoform is the best disinfectant for use in a dental office, but he has spoken of it in connection with this appliance because it is the only remedy which so far has been used in it. Aristol or eucrophen may be better. He considered the application of vapor under pressure was destined to revolutionize this department of therapeutics, not only in dentistry, but in general surgery also. The vapor so applied comes into contact with every portion of the tissue, and leaves upon it a deposit, which if not antiseptic is at least disinfectant. It will search out every sinusity of a canal, even to the apical foramen. He believes that if necessary the whole canal can be filled with the deposit, though he had never done it. If eucrophen or aristol can be adapted to this method, he judges that they would be better agents than iodoform.

Dr. G. E. Hunt. Dr. Abbott has truly said that bichlorid of mercury is sure death to animal life, but we know that in the higher forms of life death is more easily induced than in the lower forms. It has not been clearly proved that the bichlorid is sure death to vegetable growths. The portion of the paper to which Dr. Abbott took exception was as new to him as it was to those who heard it read, but he had been assured that the experiments had been carefully conducted under the eye of competent persons. We do have failures under the bichlorid,—that is, there are cases where it seems not to secure absolute freedom from bacterial growths,—and the question arises, May this not be due to the condition mentioned in the paper? Where sepsis ensues after the use of bichlorid, may it not be caused by the washing off in the blood of the coating with which the bacteria are encapsulated?

The use of the non-alcoholic tincture of chlorid of iron is much to be commended. He would also commend the use of carbonate of iron in the form of pills, known as Bland's pills, when the patient's stomach will digest them. He does not think there is anything new about the vaporizing method described by Dr. Peabody. The subject was fully discussed by Dr. W. H. Whitslar some five years ago. It has been proved that the iodine in such cases evaporates, leaving only a carbonaceous precipitate, which is aseptic but not antiseptic, and which is therapeutically inert.

Dr. Abbott. It should be borne in mind that a few years ago carbolic acid was regarded as the best antiseptic known. Then some investigator observed parasites working their way around through crystals of the carbolic acid, showing that they were not destroyed; but subsequent investigation showed that carbolic acid when properly diluted would destroy germ life. It may be possible that bichlorid of mercury works the same way. May it not therefore be that those experiments which were performed with strong solutions of the bichlorid resulted as reported for the reason that the germs refused to imbibe the strong solution, and that if a weaker solution had been used they would have been killed? The solution which he himself used in the treat-

ment of pulp-canals was 1-10,000 or even 1-20,000. It has been recently stated that a solution of 1-100,000 was strong enough to destroy germ life. It is curious the different results that different experimenters achieve.

Dr. F. W. Low, Buffalo. In the series of experiments by Dr. Miller, of Berlin, with bichlorid of mercury, carbolic acid, iodoform, etc., he stated that a preparation of 1-480 of bichlorid of mercury was the only one that would destroy germ life in agar cultures. With regard to root treatment, if others had had the same experience with iodoform that the speaker has had, they would not use it; not merely because of its disagreeable odor about the office, but because patients sometimes complain that they taste it for months after it has been used in their mouths. He does not believe it is possible under any circumstances to perfectly disinfect the canals and produce antisepsis in the roots of teeth. If we remove all the *débris*, dry out thoroughly, and fill with an inert substance, we have to depend on nature to disinfect by means of the phagocytes.

Dr. Thomas Fillebrown, Boston, wished to call attention to the fact that it is not the bacteria which cause trouble. Put them into living tissue, and they perish as quickly as in any of the germicides which have been mentioned. It is only dead tissue which affords food for their support. It is, therefore, not the bacteria, but their products, the ptomaines, which cause trouble. If in any surgical operation we can be sure that we leave no *débris* behind, no tissue out of circulation, he would take chances on the development of bacteria. The necessity for the use of germicides is very much over-estimated, as an illustration of which he need only point to what Dr. Abbott had said about the different results of experiments with bichlorid of mercury by different men. For some years back the disuse of germicides has been growing. Many eminent surgeons to-day perform their operations without the strict antiseptic precautions that were once deemed necessary. It has been proved that agents strong enough to destroy germ life are strong enough to cause injury to the delicate tissues of the human organism. In his opinion, thoroughness and cleanliness are the great factors in success.

Dr. C. N. Peirce, Philadelphia. Dr. Harlan's paper alluded to trichloroacetic acid, which the speaker considers eminently adapted to the needs of dentists. He has used it as an application in spongy conditions of the gums, as in pyorrhea, and applied to the gum over an impacted third molar with excellent results. It is a powerful escharotic, and one or two applications will remove the growths. In the calcic deposits of pyorrhea it cleans off the roots and necks of the teeth after using the scalers, and removes every vestige of the calcic deposits; he has also observed that it has happy results on the tissues themselves. It will arrest the accumulation of pus in one or two applications. In opening into the root of a tooth with a dead pulp, if applied in the canal it will destroy the putrescent odor and purify the contents almost in a moment.

Dr. J. D. Patterson, Kansas City, was especially interested in the use of nitrate of silver. We have many young patients with incipient decay where it is almost impossible to insert a filling-material. Since nitrate of silver has been prominently mentioned, though some one has said that it was an old idea, he has been experimenting in its use.

If successful, it will unquestionably be a great advance. So far as he has been able to watch the cases in which he has tried it, the results have been very satisfactory, barring, of course, the discoloration of the tissue; but he does not care for that. If any others have had experience in the use of this remedy, he would like to know their opinion regarding it. If by its use we can preserve the deciduous teeth until the proper time for shedding them, and thus aid in the development and eruption of the permanent set, nitrate of silver will be a valuable addition to our list of remedies.

Dr. J. Taft, Cincinnati, O., remembered that more than forty years ago Professor James Taylor recommended the use of nitrate of silver in the treatment of teeth in his lectures in the Ohio College of Dental Surgery. Professor Taylor recognized that the darker varieties of decay were of slower progress than the lighter ones, and the suggestion was that by the use of nitrate of silver light decay would be changed to dark, and thus its course made slower. He used it in the deciduous and permanent teeth alike, and the speaker has ever since used it in that way. Last year, at Saratoga, Dr. Stebbins presented the matter to this association, and he was accompanied by a boy in whose mouth the results of the treatment were shown. He claimed that the remedy arrested decay. Dr. Taft knew that under favorable circumstances decay will be stayed by nitrate of silver. It is certainly retarded, if it is not absolutely arrested, more especially in the deciduous teeth. As to how it acts there may be a variety of opinions, but he believes it is through the exertion of its antiseptic power by the destruction of the influences operating in the process of decay.

Dr. James Truman, Philadelphia, had observed that whenever a new remedy or treatment was proposed, some one else always claimed priority. Dr. Taft says that he has known this remedy for forty years. Why has he not given us the benefit of his knowledge before this? The speaker does not remember a single paper that did not take the position that nitrate of silver would so discolor the teeth as to destroy its usefulness. For the reason that Dr. Stebbins was the first to call public attention to the usefulness of this remedy in the direction now under discussion, he holds him to be the originator of the treatment, which is one of the most important things that has been brought forward within his memory, and the credit should not be taken from Dr. Stebbins. He would confess to his ignorance upon the subject of germicides, and he did not believe there was a single one which could be absolutely relied upon.

Dr. Taft disclaimed making pretensions as to originality with regard to the use of nitrate of silver. He had not kept his lips sealed upon the subject, but had presented it from time to time before various dental societies.

Dr. James McManus, Hartford, Conn. There is no question that the use of nitrate of silver is of many years' standing. His preceptor, he remembered, used it about the necks of teeth for obtunding sensibility. Some four or five years ago a lady came into his office with her teeth badly discolored about the necks, and on his questioning her she told him that they had been treated by a dentist in Indianapolis with nitrate of silver for sensitiveness. There is no question that it has been largely used for this purpose by many men.

Dr. C. H. Harroun, Toledo, has heard both Dr. Taft and Dr.

Taylor report cases in which nitrate of silver was used, and he himself has used it upon their recommendation.

Dr. W. C. Barrett, Buffalo, thought Dr. Truman's memory must be defective. He has heard Dr. Taft speak of nitrate of silver; once in particular that he recalls was at the Michigan State Dental Association; but he apprehended that Dr. Taft thought the use of this agent well known, and that it was only necessary to call attention to it as an accepted remedy which possessed certain disqualifying properties.

Dr. Truman disclaimed any intention of questioning what Dr. Taft had said. He merely asked why he did not publish to the world the results he obtained. He was perfectly familiar with the fact that nitrate of silver was used in dentistry for many years, but its use as a preventive of caries he had not heard of until it was introduced by Dr. Stebbins.

Dr. T. T. Moore, Columbia, S. C., wished to call the attention of Dr. Truman to the fact that the institution in which he (Dr. Truman) was a professor more than twenty-five years ago taught the use of nitrate of silver for the arrest of decay and as an obtunder to sensitive dentine.

Dr. Peirce could not remember the time when he did not have nitrate of silver in his office. He had always used it to remove sensitiveness, not for arresting decay; in this field Dr. Stebbins is the first who has published a systematic series of experiments showing its value.

Dr. Peabody stated that he had used this agent more than twenty years for removing the sensitiveness of teeth at their necks; but he had only used it for twelve months to arrest decay, and he had never heard of its use in changing light to dark decay.

Dr. J. Y. Crawford, Nashville, Tenn. There is no question that nitrate of silver has been recognized in the treatment of diseases of the oral cavity ever since the organization of the dental profession. Both sides are right and both are wrong. The point at issue is, Who is entitled to the credit of its first application to carious cavities? In his opinion, the gentleman from Massachusetts is unquestionably entitled to that credit. Many others have written of nitrate of silver as an obtunder, and it has long been used to give comfort to the patient.

Dr. Harlan. The points brought out in the discussion are quite satisfactory to the section making the report; but to clear up the cloudiness concerning the use of bichlorid of mercury solutions he would state that Laplace's experiments showed that the addition of five parts of tartaric or hydrochloric acid, or even carbolic acid, to the 1-1000 solution would make it absolutely reliable. There has been nothing to disprove that. Dr. G. V. Black uses his bichlorid of mercury dissolved in peroxid of hydrogen, which as you all know is slightly acidulated, and he has clinically proved that the position of Laplace is correct, so that he has never found occasion to abandon the use of the bichlorid in that form. With reference to the properties of eucrophen and trichloracetic acid, eucrophen is an agent which is destined to take the place of iodoform, as it is almost inodorous, is non-poisonous, is five times lighter than iodoform, and will answer all purposes for which the iodoform is used. Trichloracetic acid is very

useful for the solution of serumal deposits, as a stimulant, as an astringent to check the production of pus in so-called pyorrhea pockets and elsewhere in the mouth. It is also excellent as a refrigerant mouth-wash in inflamed conditions of the mucous membrane when more powerful agents are not indicated. For this use a solution of one-half to one per cent. in water is excellent. It is fairly soluble in water, and for the dissolution of deposits on the roots of the teeth a ten per cent. solution may be used, and then it may be antidoted with any approved alkaline solution at hand.

The section was passed.

Section IV, Histology and Microscopy, was called, and Dr. Frank Abbott, chairman, reported verbally that he was compelled to appear with nothing but a report of progress. He had been delayed in having an instrument made to illustrate certain work until it was too late to prepare a paper. This instrument he expected would produce very excellent results, and would clear up some disputed points in pathology, unless he was mistaken as to its capabilities. The section had one paper to report, by Dr. C. W. Stainton, of Buffalo, N.Y., entitled "Crownless Teeth."

Dr. Stainton read his paper and showed casts of the cases described.*

Dr. Abbott. The history of these cases carries us back to the study of embryology, to the time of the formation of these teeth. What the cause of this imperfect development was he could not say, but there appeared to be no question that the function of the enamel organ had been interfered with in the deposit of lime-salts. These cases here presented appear to be hereditary. We have isolated cases occasionally where every tooth in the mouth is presented in much the same condition as these. In these the cause of the imperfect development is usually some local disturbances in the mouth itself. There is no faulty development of the enamel, as a rule, where a local disturbance is not present. He recalled the case of a little boy in whose mouth the incisors had no enamel, indicating evidently that the papilla was not performing its proper function. The mother said the child had never had any serious illness, which statement was borne out afterward by the father, who was a physician, to whom he had said that some disturbance must have occurred at the period of the development of the teeth. A few days later the mother came in and said that after studying over the subject she recalled that the child had had some sort of an eruption over its head and face, which extended into the mouth, causing it to become very sore, though the child otherwise was not ill. That was the cause to which he attributed the condition of the child's incisors. Not very long since a child presented with every tooth of a dark yellow color and highly pigmented, which condition indicated an imperfect disposition of the lime-salts, a condition which always invites pigmentation, as the lime-salts are not packed solidly together, and the organic substances being in excess, take up the coloring-matter, and the tooth becomes dark. Perhaps the original cause of the difficulty may have been some local disturbance. This may have occurred in each individual in this family whose peculiari-

* This paper, with illustrations, will be found at page 978 of the DENTAL COSMOS for December, 1892.

ties have been presented by Dr. Stainton, as an attack of thrush, eczema, etc. Remember that the enamel organ is a dipping down of the epithelium of the gum, and that disturbances of this may be readily communicated to the enamel organ. The case reported by Dr. Stainton is extremely interesting, and if some of the teeth could be had, he would be glad to make sections and study them microscopically. He had presented the subject himself before this association some years since, but at that time he did not bring out the fact that the cause is always local and not general.

Dr. Peirce would dissent from the view of Dr. Abbott that the condition shown in this case was the result of a local disturbance. So far as the meager history given will inform us, it seems to be an inheritance from the grandmother on the father's side. We have all seen such cases. He recalled one case where the mother and father were both consumptives, and all during gestation the mother was on the verge of the grave. The child never had any enamel on either the permanent or the deciduous teeth, which he believed was due to the malnutrition of the mother and afterwards of the child itself, which died at the age of twelve years.

Dr. Morgan believed the condition to be evidently the result of an inherited predisposition, where the enamel organ did its work imperfectly because of inheritance. Conditions very similar to those shown here arose from general disturbances, especially those diseases which involve the dermoid tissues, as scarlet fever, measles, chicken-pox, etc. If the child suffers from one of these during the formative period of the teeth, the enamel organ becomes involved and fails to perform its function properly. Such interferences frequently result in pits on the teeth, so that by observing their location we can come within a few months of the time when the disturbances occurred. These results may follow local disturbances. He has observed cases where long-continued abscesses of the deciduous teeth occurred and in which he expected to find the permanent teeth imperfect because of that local disturbance, and he found that his theory was verified by the occurrence of spots upon the teeth, which soon decayed and required treatment.

Dr. A. O. Hunt, Iowa City, Iowa, wished to call attention to some points not touched upon by the speakers, but which were shown in the models. Everything indicates that the teeth were fully developed. The process is normal and the appearance is that each tooth passed along normally to eruption, and there is no indication of disturbances up to that time. The enamel, however, is gone apparently to the gingival margin. He would like to ask if the portions extending below the gingival margin and to the necks of the teeth were covered by enamel at all?

Dr. Stainton replied that the appearance of the whole structure is that of secondary dentine.

Dr. A. O. Hunt. The appearance of model No. 1 indicates that at some time the cutting-edges were longer and that abrasion has occurred. The point was not mentioned in the paper, but he wished to ask a question in relation to that. Dr. Abbott said that the enamel organ had evidently not been able to perform its function properly. It appeared to the speaker that the full function of the organ had been exercised for a time, and then the work was interfered with. Had not

outside influences removed the lime-salts either before or after the teeth were erupted?

Dr. Abbott. So far as these cases are concerned there is no doubt there is something in the idea of heredity. He does not claim that every child that has suffered from measles or whooping-cough has defective teeth in consequence, for the reason that the disease does not necessarily take hold of the membrane immediately over the point where the teeth are forming. In scarlet fever, as is well known, there is sore throat, and sometimes this becomes so severe that the most strenuous efforts are necessary to save the child's life. In such cases, if the teeth are closely watched, they will be apt to be found defective. In measles also, if the disturbance goes on far enough, the child will have defective teeth. In any disease of this character, if the disturbances are severe enough, you may expect defects of the enamel.

Dr. C. C. Carroll, Meadville, Pa., combatted the idea that disease can be inherited. It is pretty generally conceded that one cannot inherit disease, but merely the tendency to that disease, and hence in speaking of heredity we should refer only to a tendency which under favorable circumstances may develop into disease.

Dr. Barrett could not concede that the pitted or otherwise imperfect enamel so frequently found could be attributed wholly to either local or general disturbances. If it were a fact that it was due to general systemic disturbances, then whenever there should have been such a condition as to produce it in one case it would produce it in all. Many of us know there are cases of desquamation from scarlet fever in which the pitted enamel does not follow; severe cases of dermal diseases where there have been no imperfections of the teeth. On the other hand, after exceedingly light attacks of the eruptive diseases, or even where there have been none, the teeth have been pitted, the enamel exceedingly imperfect. Law is unvarying, and like causes always produce the same results. He has known cases where there was no history of disease of any consequence in which the pitted enamel appeared. He appealed to those present to know if, when seeking the cause for these conditions, they have ever had No for answer in reply to questions as to whether the child had suffered from eruptive diseases. Almost every child has one or the other of these. If it were the case that these appearances were due to such disturbances, the results would be more general. Moreover, if general disturbances were the cause, it seemed plain to him from the form in which the enamel is laid down over the cap it would be imperfect all over if imperfect at all. We have not yet reached the limit of possible knowledge on this subject. The fact that imperfect enamel is usually found in ridges and furrows shows that it cannot arise from a temporary change in the condition of the child. We sometimes find it merely as a spot or a line or a furrow or a pit. The observed facts led him to think that the trouble arises more from some difficulty in the enamel organ itself. He does not mean to claim that local irritation may not have some effect, but that it does not explain all the facts that are observed, and he believes that pitted or furrowed enamel is due to a difficulty in the enamel organ itself, through which it is prevented from performing its functions perfectly.

Dr. W. N. Morrison, St. Louis, Mo. There seems to be a labored effort to locate the responsibility for these conditions, when

the more important practical question is how to correct the difficulty. He took issue with the manner in which the writer of the paper had proceeded in the case he had attempted to correct. The speaker's observation had been that in nearly all cases of this kind the roots of the teeth were well developed and well set in the jaws, and it seemed a plain proposition to him that he should not destroy these foundations, but should supplement them by furnishing what nature had failed to furnish. He would suggest that the best way to proceed would be to lengthen the crowns, probably one-eighth of an inch, or possibly more. He would lengthen the bite as much, and construct metallic crowns on all these roots, upper and lower, and preserve the proper alignment between the lips. The decision of the young lady in the third case not to part with the stumps was decidedly wise.

Dr. J. J. R. Patrick, Belleville, Ill. It is a well-established fact that the teeth are derived from the same source that the whole organism is originally derived from; that is, from mucous membrane. The dental follicle and Graafian follicle have their origin from the mucous membrane. The enamel of a tooth could not be affected by the causes which have been spoken of here, only in the early stages of its formation, when it is still plastic. If it is once formed, it can be injured mechanically, and when so injured it has no power within itself of repair. He had observed cases through a series of years illustrating defects in the enamel of the first or deciduous and the succedaneous teeth. He had in one family three well-defined cases in which the enamel of the teeth was defective, due to the influence of eruptive fevers during their incipient growth. Five months before the birth of the youngest of these the mother contracted scarlet fever from nursing one of her other children through an attack of that disease. When the incisors of the child born under these circumstances made their appearance, the enamel was defective and was entirely absent at the incisive margins. Some months afterward another child of three years had the measles, and the youngest also contracted this disease. The youngest is now ten years of age. Her succedaneous teeth appeared two years before the usual time, and the enamel was crude, pitted, and defective in quantity, and grooved and granular.

Dr. Joseph Head, Philadelphia. Was there anything extraordinary about the mucous membrane of the entire family, or of either the father or mother? Perhaps it may be possible to trace the condition to this. In his own family a nephew at the age of three months had capillary bronchitis. The child was very ill, and hung between life and death for ten days. When the centrals and laterals of the deciduous dentition came through the gum, there was a distinct band all the way around them. In fact, all of the deciduous teeth were so affected that the boy was disfigured. He has now reached the age when his permanent incisors have erupted, and they are in every way normal.

Dr. S. H. Guilford thought that the case presented by Dr. Stainton was merely an exaggerated example of a somewhat common condition. From an examination of the models, it seemed to him that the crowns must have been there some time and have been worn off. Probably there was no enamel covering and they quickly disappeared, but there are evidences of attrition on some of these teeth, which point to this condition. For instance, the third molars of the lower jaw appear to have well-developed cusps, while all of the others are worn off.

Dr. Stainton, in reply to the question as to the mucous membrane, said that in only one case did it differ in appearance from what is ordinarily seen. One of the boys was an inveterate smoker, and the mucous membrane of his mouth looked like the white of a boiled egg. With reference to the cusps of the lower third molars referred to by Dr. Guilford, it was noticeable that these teeth have no antagonists, so that there was nothing whatever to wear the cusps down. As to the objection to the method of treatment which Dr. Morrison had advanced, he could readily demonstrate that crowning the teeth was impossible, as the roots were not normal. Some of them were not over one-sixteenth of an inch long. Two-thirds of them were very loose, and there were no root-canals; there was not a normal-shaped root among them, and they looked more like hoarhound candy run together than anything else he could at that moment recall.

The subject was passed.

Dr. Barrett, from the committee on the revision of the constitution, handed in the report, which was accepted. The report is substantially as printed in the Transactions for 1891, with the exception that the committee had stricken out the alternate readings, etc. It will be considered in a later issue of the DENTAL COSMOS.

(To be continued.)

DENTAL SOCIETY ANNOUNCEMENTS.

WORLD'S COLUMBIAN DENTAL CONGRESS.

STANDING COMMITTEES.

THE following additions have been made to the Committees of the Congress, and are to be added to the list as published in the DENTAL COSMOS for April, 1892, page 324:

COMMITTEE ON CONFERENCE.

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 EDITORIAL.

SOME MORE OF THE DENTAL ASPECT OF IT.

OUR editorial critique of Dr. Forchheimer's book, "The Diseases of the Mouth in Children (Non-Surgical)," which was published in the DENTAL COSMOS for June, 1892, under the title, "The Dental Aspect of It," has brought out several expressions of opinion from

a number of writers in various periodicals. These present the usual divergencies which generally result from differences in point of view upon a subject which occupies the position which this one does as between dentistry and medicine. The December, 1892, number of the *International Dental Journal* contains an article by an English medical man, A. Bethune Patterson, M.D., who from his London hospital connections appears to be either an oculist or throat specialist, and who seems therefore to regard himself as a competent authority on pathological dentition. If we understand his argument correctly, he takes this final ground: It being proven that all inflammation is the result of infection by micro-organisms, and that pathological dentition is "signaled by the common evidences of inflammation, viz, redness, swelling, etc.," ergo pathological dentition is caused by pathogenic germs which find their way into the soft tissues of the mouth through fissures and abrasions of the mucous membrane produced by the injudicious application of teething-rings and hard substances used by well-meaning but ignorant nurses and mothers to assist in the process of eruption of the milk-teeth. This argument, and in fact the whole article, is critically and patiently demolished by the editor of the *International Journal* in the same issue, in an editorial entitled "Dentition." We have quoted Dr. Patterson's argument here as an illustration of the fantastic mental gymnastics which may result from a general familiarity with bacteriology on the one hand, and insufficient familiarity with the dental aspect of it on the other. The issue of the *University Medical Magazine* for July, 1892, contains a communication from Professor Horatio C. Wood, defending the use of the lancet in cases of difficult dentition in children, and advocating in strong terms the operation of gum-lancing, from the standpoint of personal experience in these cases, and on the grounds so clearly stated by Dr. J. W. White in the "American System of Dentistry," and quoted in our editorial, "The Dental Aspect of It." This communication from Dr. Wood has called forth a reply from Dr. Forchheimer in the December, 1892, issue of the *University Medical Magazine*, which is interesting and valuable because it fairly states his position respecting the points at issue. He says,—

"Where Dr. Wood says he 'is absolutely sure that he has seen convulsions, sick stomach, great restlessness, fevers, and various other functional disturbances in young children immediately cured by the use of the gum-lancet after the failure of various other well-directed measures for relief,' I can only say that such has not been my good fortune. While I have lanced or *scarified* [italics ours] the gums of only one child, I have seen it done so often that I am bold enough to claim that my experience with this operation has been sufficiently extensive to warrant me in drawing conclusions. . . . As our knowledge has grown more exact, the indications and operations have become more restricted, so that now we find the operation limited to

'various other functional disturbances' principally, and the method reduced to 'dividing the dense tissue that binds down the teeth.' . . . Theoretically the subject has been gone over and over again, with the result that is found in these two letters: absolute diversity of opinion.

"The backward pressure of the tooth is no new thing; the tooth has been supposed to press in all directions,—toward the mouth, laterally, and backward. This pressure has never been measured, and, in my opinion, is evolved from the inner consciousness of the authors. . . . It is denied that the sensitive pulp is in a condition of irritation; that there is a morbid activity in dentition; that there is augmented vascular and nervous action; and that there is hyperemia sufficient or insufficient. All with the exception of augmented nervous action could be detected upon post-mortem examination. Has any one found them? If so, why have their results never been published?

"Now, if all these things do not occur, as many believe, what is the use of 'dividing the dense tissue'? or even going further, as has been suggested, and extracting those teeth? . . . The results of gum-lancing are either *post hoc ergo propter*, or due to loss of blood. Let any one to-day treat infantile convulsions, for instance, by gum-lancing alone; let him publish his results, and see what a scientific spectacle there would be. Take any one of the *symptoms* ascribed to teething by Dr. Wood, on the other hand, exclude teething as a possible cause, find the cause somewhere else and remove it, as can be done without lancing the gums, and what other course of reasoning is left but the one I here indicate?"

We quote thus fully from the article in question because its argument seems to us to carry its own answer, or it at least promptly reveals its innate weakness when once stated. We must believe that the authority quoted never saw the operation of gum-lancing done by an operator who did so from the standpoint of an intelligent understanding of the procedure and the symptoms and conditions indicating the necessity for it. We have his statement, both in the article quoted and in his published work, that he never performed it himself but upon one occasion. Nowhere has he given evidence that in his mind there is any distinction drawn between the therapeutic usefulness and applicability of scarification for the purpose of blood-letting, and of free division of the gum to relieve backward pressure upon the formative pulp-organ. He evidently does not know that in many instances the profoundest disturbances of the general nervous system of infants, directly traceable to dental irritation, occur in cases where the tissues of the gum show none of the classical signs of inflammation, and that these are promptly and fully relieved by completely dividing the gum over the tooth or teeth next in order of eruption. His view is shared with Dr. Patterson, from whose article in the *International* we have quoted, and who says that pathological dentition "is signaled by the common evidences of inflammation, viz, redness, swelling, etc." Those who have carefully observed

these cases know that many of the most serious cases of nervous irritation are not so "signaled" by local inflammation.

Dr. Forchheimer characterizes the results of gum-lancing or scarification, which he persistently classifies together, as "*post hoc ergo propter*." While we deprecate the *tu quoque* style of argument, we must regard his critical application of the phrase quoted as in the same sense applicable to the line of reasoning by which he attempts to explain on other grounds the disturbances incident to infant dentition. We quite agree with him that under the artificial conditions which he imposes, —viz, to "take any one of the symptoms ascribed to teething, and exclude teething as a possible cause, find the cause somewhere else and remove it,"—no other course of reasoning would be left to him; and even though in such an instance it would still necessarily be a case of *post hoc ergo propter* logic, it would as definitely prove the truth of the point for which he contends as the cause of any similar pathological phenomenon can be proven. But it is just here that from the dental aspect of it he is in error, and his proposition to exclude the teeth as a factor is not admissible, because the ample experiences of many competent and reputable observers, both medical and dental, point to dental peripheral irritation as the exciting cause of certain pathological nervous phenomena in teething infants, which phenomena have uniformly ceased their manifestation almost immediately after the proper and judicious use of the gum-lancet, not for the purpose of blood-letting, but for the freeing of the imprisoned tooth; and the result has occurred so uniformly *post hoc* that the deduction *ergo propter hoc* is justified.

Why it is that a certain class of medical men will persist in ignoring the nervous relationships of the teeth, and the immense importance of their pathological significance when viewed as a part of the whole economy, and continue to regard them in about the same light as they do the hair and nails, is difficult to understand in view of the copious literature on the subject, replete with authentic reports of cases directly in evidence as to their special relation to problems of general pathology, not to mention the constantly occurring examples from a clinical standpoint in further illustration of this relationship that come under the care of the general practitioner, and which easily manifest their significance to the careful and competent diagnostician.

When the writer of a book on diseases of the mouth in children poses as an authority on, among other things, the subject of pathological dentition, and then explicitly denies that the sensitive pulp is in a condition of irritation, that there is morbid activity in dentition, that there is augmented vascular and nervous action, and that there is hyperemia sufficient or insufficient in these cases, we may be pardoned for questioning as to the probability of his having closely

examined even so much as the one case for which he is on record as having scarified or lanced,—it is not clear which,—and whether his knowledge of the subject is not like his recorded result in this case,—*nil*.

AN ENLARGED DEPARTMENT OF THE DENTAL COSMOS.

WE desire to call the attention of our readers to an important change in the "Hints and Queries" department of the DENTAL COSMOS. With this issue and hereafter it will be called HINTS, QUERIES, AND COMMENTS. In connection with the change of title we propose to inaugurate a change in policy and departure from the former conduct of this department, which we believe will be mutually valuable and of interest and importance to all who read the DENTAL COSMOS. We have heretofore published under "Hints and Queries" such short articles, properly coming within the range of its title, as were not available for publication as "original communications," either because of their brevity, or lack of the usual elements of composition which characterize the more formal contributions. The limits of the old title of "Hints and Queries" have grown to be too restrictive, and room is needed for the expression of minor data, both professional and personal, not only from the editorial point of view, but from that of the profession at large. The department of "Hints, Queries, and Comments" will hereafter be open for short editorial comments upon all matters relating to the entire field of dentistry, and such data relating to personal and professional interests as may become legitimate subjects for publication. We extend to our readers a cordial invitation to make use of this department for recording in brief such matters of dental practice or experience as may be of general interest to the profession. It is our desire to stimulate the habit of promptly recording data which are continually arising in the experience of every dentist, and which are so often lost to the general profession owing to the trouble which the writing of an article entails to the busy practitioner. To these we say, Send us the item even if it be compressed within the compass of a postal card, and we will find a place for it in this department if worthy. The practical good which is easily derived from such a record of experiences and interchange of opinions should enlist the interest of all practitioners, and to that end we earnestly solicit their co-operation.

THE NEW SPELLING OF CHEMICAL TERMS.

THE changes in the spelling of chemical terms recommended by the American Association for the Advancement of Science, and adopted as the standard in our editorial work, are used throughout the text of this issue of the DENTAL COSMOS, as announced in the December number.

OBITUARY.

DR. GEORGE ROBERTS.

DIED, in Philadelphia, Pa., December 14, 1892, of fatty degeneration of the heart, DR. GEORGE ROBERTS, in the sixty-ninth year of his age.

Dr. Roberts was born in Chester county, Pa., in 1824. He studied dentistry with Dr. John Anderson, of Kennett Square, Pa. He commenced practice in Oxford in 1847, and two years later entered into partnership with Dr. Anderson at Kennett Square, which relation continued until 1853, when he removed to Talbotton, Ga., where he practiced until the breaking out of the Rebellion. He then came to Philadelphia and practiced with his brother, Dr. Spencer Roberts, and finally established himself on Arch street, where he died.

Dr. Roberts was a member of the Odontological Society of Pennsylvania. He was married in 1854 to a daughter of Dr. Anderson at Kennett Square. She survives him, with three sons and one daughter.

PERISCOPE.

PEROXID OF HYDROGEN IN DISEASES OF THE NOSE AND THROAT.—At a meeting of the American Pediatric Society, Prof. A. Jacobi warned the profession against the indiscriminate use of peroxid of hydrogen in diseases of the nose and throat. According to the doctor's observation, a weak solution of the purest preparation will irritate some throats. In some patients it seems to possess the power of corroding the mucous membrane, or of causing the formation of a thin pseudo-membranous coating. It seems also to have a decided detrimental effect upon certain diphtheritic throats, and marked improvement at once takes place after its discontinuance. In view of facts recently reported by reliable observers, the conclusion seems inevitable that peroxid of hydrogen is a preparation to be used with extreme caution in the nose and throat.—*New Remedies*.

TEETH-BLEACHING.—The *Revue Thérapeutique* recommends the two formulæ mentioned below for removal of the discoloration of the teeth following the prolonged use of solutions of corrosive sublimate or boric acid:

- R—Sulph. depurat., 100.0 (℥ xxv);
 Ol. menth. piper., 0.5 (℥ viiss);
- R—Sulph. depurat., 50.0 (℥ xiiss);
 Magnes. ust., 40.0 (℥ x);
 Menthol, 2.0 (℥ ss);
 Glycerin., q. s.

To make a fluid paste.—*Condensed Extracts*.

THE ANESTHETIC ACTION OF PENTAL.—Chalalb (*Pharm. Ztg.*, 1892, No. 45, p. 354) was unable, in four cases, to obtain a narcotic effect with pental where thirty-two cubic centimeters (eight drachms) were used. As the result of his experiments with this remedy, he concludes as follows:

Anesthesia by pental is only superficial.

Anesthesia by pental requires more time than that by chloroform.

Pental acts unfavorably on the circulation, and in large doses is not devoid of danger.

As a local anesthetic pental is much inferior to ether.—*Les Nouveaux Remèdes*, Aug. 24, 1892.

THE SALIVA AND PATHOGENIC MICRO-ORGANISMS.—Sanarelli (*Centralbl. f. Bakt. u. Paras.*, January 9, 1892) says that, considering the frequent presence of pathogenic micro-organisms in the mouth, it is remarkable that primary lesions appear so rarely there, and that wounds heal so kindly. The first condition has been attributed to the chemical properties of the saliva, to the resistance and regenerative power of the tissues of the mouth, and to the conflict between pathogenic bacteria and saphrophytes. The author investigated the properties of the saliva in respect to the growth of the micro-organisms most often found in the mouth. The saliva is shown to possess bacteria-killing properties not unlimited in degree, but dependent upon certain conditions, and chiefly on the number of micro-organisms introduced into it. Thus the *Staphylococcus aureus*, the *Streptococcus pyogenes*, the *Micrococcus tetragenus*, and the typhoid and cholera bacillus perished if in small quantities. The diphtheria bacillus and the pneumococcus behaved differently, but the former at length ceased to thrive and the latter lost its virulence. It is not yet clear to what substance the saliva owes its bacteria-killing properties.

The author sums up that the saliva is an unfavorable cultivation medium for certain pathogenic micro-organisms, destroying them (when not too abundant) more or less rapidly, and that it so alters the type in others (for example, pneumococcus) as to render them powerless.—*Cincinnati Lancet-Clinic*; from *British Med. Jour.*

EUGENOL-ACETAMID is recommended as a new anesthetic. Following is the method of its preparation:

Monochloroacetic acid is acted upon by eugenol sodium, when eugenol-acetic acid results. By treating the latter with alcohol and hydrochloric acid gas it is converted into the "ethylester" of eugenol-acetic acid. Strong alcoholic ammonia converts this into eugenol-acetamid. As crystallized from water it occurs in lustrous scales; from alcohol in fine needles; melting at 110°.

This compound, when applied in the form of a fine powder, produces local anesthesia without any caustic action, similar to cocain. This anesthetic effect, in connection with the strong antiseptic properties of eugenol-acetic acid, secures a place for this new amid in the treatment of wounds.—*Pharm. Centralh.*, 1892, p. 441.

PLASTER-OF-PARIS FORMULÆ.—1. *To Make Plaster Set Hard.*—Mix best plaster of Paris with about ten per cent. (more or less, according to effect ascertained by preliminary experiment) of very finely powdered marble (calcium carbonate). Or add to it about six per cent. of powdered alum, or about the same amount of ammonium chlorid, before mixing with water.

2. *To Make Plaster Set Slower.*—Mix it with two to four per cent. of powdered althæa root before adding the water. This not only retards the hardening of the plaster, but also enables it to be cut, filed, sawed, and turned.

An addition of eight per cent. of althæa powder retards the complete setting of the plaster for about one hour, so that the mass can be used for any purpose where it is to remain plastic during at least a portion of that time.—*Amer. Druggist*.

HINTS, QUERIES, AND COMMENTS.

DR. CHARLES H. TAFT announces the removal of his office and residence from 273 Oakwood Boulevard to 5401 Jefferson Avenue, Hyde Park, Chicago, Ill.

TRICHLORACETIC ACID should receive a careful investigation as a medication in dental practice. Its range of applicability in its various dilutions is a wide one,—stimulant and refrigerant, antiseptic, escharotic, and solvent of salivary concretions about the roots of teeth. It promises to be a valuable addition to the dental materia medica.

DR. SCHREIER's preparation for the treatment of putrescent pulp-canals has the appearance of a soft, almost semi-fluid amalgam. It is contained in a small test-tube about 5 cm. long. The surface of the preparation is covered with a layer of wax or paraffin, over which is placed a thin cork, and the whole coated with ordinary red sealing-wax. To use the preparation, a hole is punched through the cork and paraffin layers by means of a pointed instrument, and the nerve-broach inserted through the hole thus made as directed in his article in this issue. The preparation is probably a simple alloy of sodium and potassium, and not an amalgam, as preliminary tests have failed to show the presence of mercury. Practical tests of the preparation have yielded satisfactory results, and the use of it as advocated by Dr. Schreier marks a distinctly new method in pulp-canal treatment, which combines the valuable elements of several of the older methods to a degree which, on general principles, makes it worthy of full investigation. We hope to be able to report upon it more fully in a later issue.

ASBESTOS FIBER IN ROOT-CANAL TREATMENT.—The use of liquid or semi-fluid substances for root-canal dressings or fillings is rendered extremely difficult in the superior teeth without the assistance of some fibrous material which acts as a carrier or vehicle to overcome the effect of gravitation, and so secure the placing of the dressing fully to the apex. Cotton wool, silk, or lamb's wool, and in fact all of the fibers used in this connection, present the uniform objection of inviting the absorption of secretions through their porosity, and by reason of their organic origin of developing a tendency to putrefactive changes with resulting irritating effects on the pericemental membrane. For the past two years I have used with much satisfaction for the purpose under consideration, a long-fiber Canadian asbestos, which is to be had from the dealers in asbestos materials. It should be obtained in its native condition as rock asbestos, not separated into the fine woolly condition by the mechanical processes used in preparing it for commercial purposes. The best variety occurs in irregular masses, deep emerald green in color, with a fine striated structure in which the fibers are in bundles from one-half to two inches in length. For use in pulp-canals, the fiber is readily obtained from such a mass by holding it in the left hand and rubbing off a sufficient quantity in a fine silky condition by using the ball of the right thumb applied at right angles to the length of the fibrous mass. By rubbing it in this manner for a short time a flock of extremely fine fiber will be obtained, which can be twisted into a suitable wisp, having great tensile strength and a certain rigidity which enables one to readily carry it, even when moistened with a medication, to the apex of the canal. The material described has certain marked advantages over any other fibrous material in common use for the purpose, —viz, it is inorganic and undecomposable by any of the substances ordinarily used for pulp-canal treatment; it is unaffected by the ferment agents there present; it is by reason of its non-combustible character readily and instantly sterilized by passing it through an alcohol flame and heating it to redness; it makes a suitable and unalterable vehicle for the application of tincture of iodine, potassium permanganate, nitrate of silver, sulfuric acid, or any of the agents which disintegrate cotton or wool fiber, as these are prone to do when used in concentrated solution. Further, it makes a most excellent vehicle in connection with oxychloride of zinc, chloro-percha, or paraffin as a permanent and unalterable root-filling material.—EDWARD C. KIRK.

PHENATE OF COCAIN AS A LOCAL ANALGESIC.—I use the phenate of cocain topically, not by hypodermic injection. The method followed is to dry the gum about the tooth and apply a small pledget of absorbent cotton wet with the phenate of cocain in fifty per cent. alcoholic solution.

This is left in contact as nearly as possible all about the tooth, with a caution to the patient against swallowing the saliva; not because a poisoning influence is feared, but to avoid the numbness of the throat which follows upon the application of the phenate of cocain to all soft tissues.

One tooth at a time only has been treated, and for extraction it is not intended to claim complete anesthesia, but a great control of pain. The expression, "entirely subduing pain," as used in my paper in the DENTAL COSMOS for December, 1892, has reference more especially to traumatic operations in tumors and abscesses, although great comfort follows the use of phenate of cocain in extraction. It should be applied for from three to five minutes at a time, and the gums tested by puncture. If anesthesia be not complete, the application should be repeated.—CHAS. B. ATKINSON, D.D.S., New York.

A CASE OF MULTIPLE SUPERNUMERARY DENTITION.—The following case was presented to the Odontological Society of Pennsylvania:

A lady of thirty-five years of age, who had worn a full artificial denture for eight years, applied to me for relief from facial neuralgia on the left side.

On examining the mouth, I found a tumor about two centimeters in diameter at the posterior part of the superior maxilla, left side, just over the tuberosity. On passing my lancet into the tumor, I discovered the presence of enamel, and making a free incision took out what was evidently the third molar. The crown was turned a little toward the cheek, but otherwise it was in nearly the normal position. On again examining the cavity, I withdrew from it three additional teeth, held together with what appeared to be fibrous connective tissue. They occupied a position just beyond the one first extracted. The general appearance was that usually seen in the case of supernumerary teeth, gradually diminishing in size from the wisdom-tooth to the smaller one, which latter was not over the sixteenth of an inch in length. Their relative position to each other was interesting, in that the group of teeth united by their fibrous connection represented a spiral arrangement or whorl, somewhat resembling the whorl of the snail shell in general outline. The individual teeth presented certain characteristics. The wisdom-tooth was a normal three-cusped molar, with fused roots. The supernumerary tooth next adjoining fitted closely into a depression upon the side of the first tooth, following a line slightly off the vertical axis of the wisdom-tooth. It had six well-formed cusps, arranged in two parallel rows of three each. The next adjoining supernumerary fitted similarly into a depression in the supernumerary just described, and had four distinct, well-formed cusps of the bunodont type. On the distal approximal surface of this tooth was a well-marked cavity of decay, the carious action having penetrated through the enamel and well into the dentine. The existence of true caries under these conditions is extremely interesting from the fact that the teeth were completely covered by the soft tissues of the gum, and therefore entirely protected from any direct action of the oral fluids and food *débris*. The third supernumerary, making the fourth of the group, was not over a sixteenth of an inch in length, and in its general outline resembled a bicuspid with a long buccal cusp and a short lingual cusp, with the exception that both of these were again subdivided by slight sulci, having

the appearance of an arrangement approaching an attempt at the production of a four-cusped tooth. All neuralgic symptoms ceased after the removal of these teeth, which undoubtedly were the source of the nervous irritation.—C. N. PEIRCE, Philadelphia, Pa.

SUPERNUMERARY DENTITION IN THE CUSPID REGION.—A lady presented herself complaining of distress from swelling and soreness in the region of the left superior cuspid. She had worn a full upper denture for a number of years, and could not remember whether the "eye tooth" had been broken or not. Upon operating, a cyst was discovered which was found to contain nine separate formations of tooth-substance, as though the original tooth-germ had exploded and each fragment had taken to itself enamel and dentine. One was a typical supernumerary tooth, perfectly conical in shape and half an inch long. The others were of various shapes and sizes, but upon one end of each appeared perfectly formed enamel.—J. D. THOMAS, Philadelphia, Pa.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1893.

FOR the volume which this issue opens the publisher can safely promise that it will chronicle events so far-reaching in their possibilities that no man can measure their importance.

The Columbian Dental Congress, which will commence its sessions in Chicago on the 17th of August, continuing ten days, will be the first distinctively dental gathering of international importance. One result to flow from this meeting will certainly be an impetus to the progress of practical and theoretical dentistry which should be felt for many years wherever dentistry is practiced. The Columbian Dental Congress will be the culmination of the idea of associated effort in which modern dentistry had its birth. Thenceforward the dentists of the world should be associated in the supreme work of professional advancement through systematic effort. The DENTAL COSMOS will have a full report of the proceedings of the Congress.

Among other important professional matters already in sight is an investigation along an important line of dental work which has been set on foot by the DENTAL COSMOS, and a full report of which will shortly appear in its pages.

For the rest, the DENTAL COSMOS will not be behindhand in any movement for the bettering of dental practice, the improvement of its material resources, or the widening of its knowledge. As a step in this direction the department of "Hints and Queries" will be enlarged and its importance enhanced, as stated in another place.

This issue is sent to all subscribers to the last volume. Will those who have not yet renewed oblige us by doing so at once?

THE S. S. WHITE DENTAL MFG. CO.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER, 1892.

- November 1.—No. 485,280, to G. JUTERBOCK. Amalgam.
 " " No. 485,383, to S. F. HENKLE. Chair.
 November 8.—No. 485,609, to H. M. CASEBEER. Mouth-holder.
 " " No. 485,963, to C. A. MEISTER. Rubber-dam clamp.
 November 15.—No. 486,112, to N. KUNS. Regulator.

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No. 2.

ORIGINAL COMMUNICATIONS.

THE WORLD'S COLUMBIAN DENTAL CONGRESS.*

I HAVE prepared no formal speech for this evening, for the reason that I hardly knew what particular topics to touch upon. If I knew upon what subjects information was most desired, I should be very happy to speak on those special topics.

It is a very singular and fortunate circumstance that the executive committee of the World's Columbian Dental Congress was appointed in the way in which it was, by the combined action of the two societies in this country which represent more fully than any other two societies do the profession throughout the whole country. In the resolution which was adopted it is expressly stated that the action of the executive committee shall be final and binding, and of course there can be no appeal from what they have done. This committee has pursued its course during the past two years with great diligence and care, endeavoring to do the very best thing that could be done for the honor of American dentistry and for the furtherance of the great objects of the congress. The dental community in general can of course understand but little of the amount of thought and study that has been necessary. This congress is to be a memorable one in the history of dentistry. It is to be the grandest meeting that has ever been held. I think there can be no question of the truth of this prophecy, and it will accomplish in certain lines an immense amount of good. Those lines might be divided into four divisions: The first, of course the foundation of all our progress, is scientific investigation and study, and the bringing out of the truths of science. The best men in the world, as far as the committee knows them, have been invited, and are expected to be present at this congress and to give the latest phases of dental science. In the next line, which perhaps with the majority is considered more important, but of course which we all know is founded upon the preceding one, we have the practical part of the art, and the facilities at the congress will be

* An address delivered by Dr. L. D. Shepard, president of the Congress, before the joint meeting of the First and Second District Dental Societies of the State of New York, December 13, 1892.

unsurpassed for the demonstration of methods and materials to aid each individual in the practice of dentistry. There is another line in which this congress will excel, probably, any other gathering, and that is in its broad educational results. The finance committee, in endeavoring to present inducements for the subscribing of funds, have introduced a scheme so that any one who contributes ten dollars should have all the practical results of the meeting, as far as the science goes, the same as if he were present himself; that is, that each one who subscribes ten dollars shall have the Transactions of the congress, though he stay at home. Practically, as you see, he is like a member. He receives all the transactions. It is calculated that about two thousand dentists at a distance from Chicago, who do not feel that they can attend the congress on account of the expense, will be enabled by the contribution of ten dollars to have upon their shelves the Transactions of this congress, which will make two or three large volumes. Of course this could not be afforded unless it were expected that a very large number would subscribe in this way. The original cost of the Transactions would be large, but the reproduction would be only press-work, printing, and binding, so that a subscriber who pays ten dollars will get his money's worth, and a great deal more; but there will also be profit in it to the congress.

The next line will be the social, and we all know how valuable that is. It is the meeting of man to man, the grasp of hand to hand, the looking into one another's eyes that stimulates to study, to noble deeds, and to all of the work of progress in the world more than anything else; and the social element at Chicago will be a very prominent one.

All this will cost a great deal of money, and it is confidently expected that the profession throughout the country will respond generously, so that the fund will be large enough to carry out the congress in the most liberal way; and furthermore, that the five hundred—or eight hundred as it is now expected—foreign dentists who come to Chicago will be given a welcome that shall redound to the credit of American dentistry, and make them think that we are good fellows as well as able practitioners. I hardly think I should take time, at this hour, to say more. All of the profession throughout the country who are carrying on their practice under the law of "doing as they would be done by," which is our law of ethics, will be invited to contribute. The whole country will be canvassed, and there is only one condition for contribution and one condition for membership in the congress: it is simply that the man shall be a respectable dentist, a legal practitioner in his community; and there is no other barrier, no other test, so it is expected that the response will be a free and liberal one.

We owe it, gentlemen, to ourselves on this great occasion,—the like of which none of us, of course, will live to see again, for we cannot expect to have another Columbian celebration,—to make this congress, which is but one of one hundred and five to be held in Chicago during the next summer, the best congress of all the congresses.

If gentlemen are not familiar with the work of the Auxiliary, I think a word on that subject may be of interest. At previous international expositions, something has been done in the way of congresses of different branches of science and art. It was so at Paris, in 1889.

But in Chicago next summer it is to be carried a great deal farther. They have an organization which is chartered, called the "Auxiliary," which is having built now a building costing seven hundred and fifty thousand dollars, in the city, on the lake front, and near the Michigan Central Station, miles away from the fair, which will have in it about twenty halls; two of these halls will be able to accommodate three thousand, and the others are smaller. From the first part of May to the closing of the fair, during every day of all those weeks, one or more congresses will be constantly in session in that building, which will be owned eventually by the Art Association of Chicago, and is a permanent building, built of marble. These congresses are all managed in some respects by this World's Fair Auxiliary, and they furnish free of charge all the building accommodations, and have a general oversight over the congresses, so as to make them harmonize. They are to embrace every phase of human thought and study and work which is in existence. Science, religion, music, art, manufacture, husbandry, labor reform, and everything you can think of, are to be represented at Chicago. They exact, in return for these accommodations, certain things. They are to have in our congress two evenings for the public, when they select from the subjects which we have to offer such as will be interesting to the public. That is a method of popular education. They also reserve the privilege to select from the Transactions of every congress one or more papers, as they please,—three or five if they wish,—for publication in their Transactions. They will be papers which will be interesting to scholars throughout the world. Their Transactions will number twenty or thirty large volumes, and show the highest exhibition of all the arts and sciences, and will be distributed to the libraries of the world, and will, of course, be of immense advantage to all scholars and thinkers. That is a very useful factor in connection with the congress.

There is one other thought which has made us particularly careful in the performance of our duty as the holders of the trust committed to us by the profession of America. It is this: If this congress is a brilliant success, as I think it will be, the thousands of dentists in America will have the credit; but if the congress is a failure, if it does not amount to much, we fifteen men will have to bear the blame. That is about as true a statement as can be made.

Now, gentlemen, we want the assistance of every earnest worker in our profession throughout the country, his moral support, his encouragement, and his financial support.

THE IODOFORM QUESTION; OR, THE VALUE OF IODOFORM IN THE TREATMENT OF DISEASED CONDITIONS OF THE TEETH.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

AMONG all the remedies which are or have been employed in the treatment of diseases of the human body, I doubt if one can be named which has been the subject of so many communications, or has so stubbornly resisted all attempts to work out a satisfactory theory of its action or to place a proper estimate upon its value, as iodoform.

No more would it be easy to name a substance which for a time brought theory and practice into such apparently contradictory positions.

Iodoform is not so modern a remedy as it is usually thought to be, since it was discovered by Sérullas in 1822. Fifty years ago it was used in France and America quite extensively, both internally and externally, and appears to have remained in use up to the present. Radziejewski* writes: "Iodoform is a medicament much used in the United States of America, as well for internal, nervous, and constitutional diseases, stubborn neuralgias, particularly sciatica, cold fevers, inveterate syphilis, as externally in form of salves and plasters for painful burns, cancrus sores, syphilitic periostitis, etc."

In 1862 Rhigini† recommended it as disinfectant. It was not, however, till toward the close of the seventh decade of the present century that it attracted much notice in Germany, after Lazansky‡ and Moleschott§ had broken a lance in its behalf.

These communications appear to have given the signal for a general iodoform epidemic, which spread with great rapidity over Germany and Austria, and reached its culminating point in 1881-82. In these years there was probably not a surgeon, physician, or dentist in all Germany and Austria who had not made a trial of the wonderful remedy; and if we were to recount all the afflictions for which iodoform was found to be beneficial, not many would remain unmentioned.

Tubercular affections, especially fungous processes, eczematous and lupous skin-diseases, fibroma molluscum, abscesses of the cornea and eczema of the eyelids, gonorrhea, bubo, syphilis, peritonitis, perioöphoritis, pelveo-peritonitis, metritis, perimetritis, parametritis, diseases of the mucous membrane of the mouth, nose, and throat, ozena, chronic catarrh, bronchitis, bronchorrhea, emphysema, diphtheria, otorrhea, carbuncle, furuncle, cold abscesses, phlegmon, pyothorax, purulent cystitis, gout, neuralgia, arthritis deformans, hydrocephalus acutus, anthrax, exsudations, wounds of every nature, struma, diseases of the teeth, pericementum, and jaw, and lastly, worms. These are some, but by no means all, the diseased conditions which were favorably acted upon by iodoform.

Dental surgeons also lost no time in making themselves acquainted with the popular medicament.

Schneider|| seems to have been the first to publish the results of his observations. He found it useful in combination with arsenious acid for obviating the pain caused by the latter. Scheff¶ recommended it *in place of arsenic paste*, as an incomparably better remedy for preparing an exposed, not yet purulent, painful pulp for a temporary filling!

Tanzer used it with good success in all those cases where tincture of iodine had previously been employed, also in diseases of the pulp, and even for devitalizing it.

* *Centralblatt f. d. med. Wissensch.*, 1870, S. 544.

† *Journal de Brux.*, vol. xxxv, 1862, p. 62.

‡ "Das Iodoform und seine therapeutische Verwendung." *Vierteljahrsschrift für Dermatol. und Syph.*, 1875, S. 275.

§ "Ueber die Heilwirkung des Iodoforms." *Wiener med. Wochenschrift*, 1878, Nos. 24-26.

|| *Vierteljahrsschr. f. Zahnheilk.*, 1880. Heft iv, p. 333.

¶ *Ibid.*, 1881. Heft iv, p. 357.

Skogsborg* treated pulpitis in its different stages, as well as acute and chronic periostitis (with or without suppuration), and also abscesses, etc., with his iodoform paste, with excellent results.

Wetzel† used it in the form of a ten per cent. ethereal solution for exposed pulp; furthermore, in combination with salicylic acid and morphin, for capping exposed and amputated pulps; lastly, as iodoform cement paste for root-filling. Schmidt‡ reports one hundred cases of chronic pulpitis treated according to Skogsborg's method with one hundred per cent. success, and over one hundred cases of acute pulpitis with ninety-one per cent. success.

Further references are, however, unnecessary, since the use of iodoform, particularly as a constituent of root-filling, became so prevalent that almost every dentist took part, in some way or other, in the discussion of this remedy.

Unhappily, it was almost always used in combination with other medicaments, such as carbolic acid, eucalyptus oil, oil of cinnamon, etc., so that it was impossible to determine what share in the success of the treatment was to be attributed to the iodoform.

The surgeons, however, were the most enthusiastic of all over the results which they obtained by the use of iodoform. They sometimes used it in enormous quantities. One hundred, one hundred and fifty, and even two hundred grams were poured into large abscesses, or into wounds produced by amputations or resections, and the most celebrated surgeons of Germany and Austria reported excellent results, until the numerous cases of intoxication, in part fatal, which occurred on all sides very forcibly demonstrated that iodoform was by no means the harmless material it had been assumed to be, and that a certain amount of care should always be observed in its employment.

Various observations also established the fact that an idiosyncrasy for iodoform may exist, so that even small doses may be followed by symptoms of intoxication; furthermore, that it possesses a cumulative action, in virtue of which the severest symptoms often appear after discontinuing its use.

Behring|| disapproved of the use of iodoform on bleeding surfaces, for the reason that blood has the power to liberate iodine, which, as is well known, causes the intoxication.

These experiences had the effect of appreciably diminishing the enthusiasm for iodoform, and in particular of causing it to be employed with far greater care and discrimination than had previously been exercised. It, however, continued to be used very extensively and with good results, and the conclusion was gradually arrived at that iodoform, applied with a due amount of caution, is, for certain conditions, an excellent though not infallible antiseptic.

Great therefore was the astonishment caused by a publication by Heyer and Rovsing,¶ showing, as the result of experiments, that iodoform not only possesses no antiseptic action, but, on the contrary,

* *Correspondenzbl. f. Zahnärzte*, 1882, p. 89.

† *Ibid.*, p. 276.

‡ *Deut. Monatsschr. f. Zahnheilk.*, 1884, p. 241.

|| "Ueber Iodoform und Iodoformwirkung." *Deut. med. Wochenschr.*, 1882, No. 11.

¶ *Fortschritte der Medicin*, 1887, No. 2.

itself often harbors pathogenic micro-organisms, which may be transferred to the wound in the application of the remedy.

This publication was received with a storm of indignation. It was claimed that hundreds of thousands of cases in practice had sufficiently proved the value of iodoform, and that the medical world was not to be frightened out of using a tried and approved remedy on account of a few mycological experiments, which might be correct for pure cultures, but which did not admit of drawing conclusions for the living animal body.

Nevertheless, a repetition of the experiments of Heyer and Rovsing, which was undertaken by bacteriologists on all sides, showed that their results were in the main correct, and led to the establishment of the conclusion that iodoform-powder, strewed on plates of gelatin or agar-agar, usually exerts but an insignificant retarding action upon the growth of bacteria, and often none at all, and that it has only in exceptional cases, as in that of cholera bacilli, a devitalizing action.

On the other hand, it was justly pointed out that iodoform, like every other remedy, must be in solution before it can exert its action: *Corpora non agunt nisi fluida*, and while no solution takes place on the culture-plates, it is brought about in the animal body, and particularly on wound surfaces, by the fat, the secretions of the wound, nascent oxygen and hydrogen, by bacterial products, etc.

But iodoform in solution is very unstable, easily becomes decomposed, and gradually gives off iodine, which exerts its peculiar antiseptic action. That iodine is actually set free is amply proved by its appearance in the fluids of the body, and by the many cases of iodine intoxication following the use of iodoform. De Ruyter* furthermore made the important discovery that the ptomaines have the power to set iodine free, while Behring† showed that the pus-exciting ptomaines, especially pentamethyldiamine (cadaverin), when mixed with iodoform, lose their power to produce suppuration.

It would, however, lead us too far should I attempt to consider even a small proportion of the communications that appeared on this subject. According to the views adopted at present, theory and practice seem to agree pretty nearly that a wound-surface, especially a secreting one, is favorably influenced by iodoform, not so much because of its antiseptic action as because of its power to take up the secretions of the wound as well as the products of decomposition and bacterial poisons (ptomaines, toxalbumins), and to act upon them in such a way that they lose their toxic properties.

My object in undertaking a series of experiments on the subject of iodoform was to test it from a dental point of view, and, if possible, thereby to render some assistance in the attempt to answer the question whether and under what conditions iodoform is a valuable remedy in the treatment of diseases of the teeth and surrounding tissues.

The antiseptic action of iodoform was tested: 1. In powder on pure cultures. 2. In connection with putrid matter. 3. In connection with putrid matter under the action of living animal cells. 4. By comparative experiments on the animal body.

1. The action of iodoform upon pure cultures of various bacteria from the human mouth and from gangrenous tooth-pulps was tested

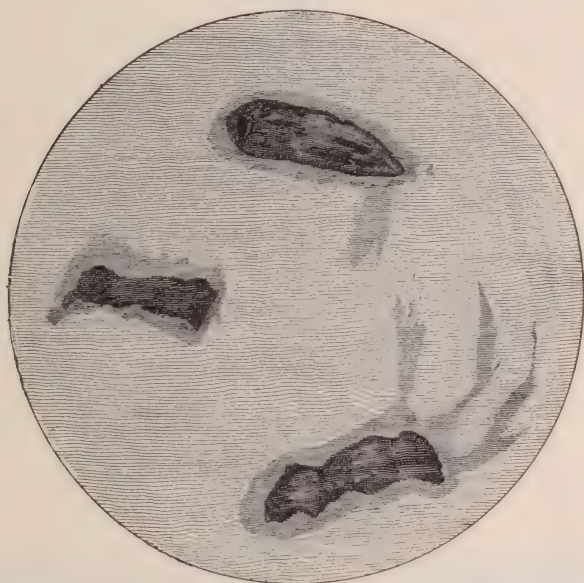
* *Deut. med. Wochenschr.*, 1887, No. 18.

† *Ibid.*, No. 20.

by strewing the powder upon certain portions of the cultures, while the other parts were left free. In no case was I able to detect any difference in the growth of the bacteria in different parts of the culture; they grew in the immediate proximity of the iodoform as well as at the points most remote from it. Only among a few cases where the plates were kept for twenty-four hours at a temperature below that at which the bacteria grew (in order to give the iodoform ample time to develop its action), before putting them into the incubator, one showed a very slight retardation in the development where large quantities of iodoform had been used.

2. In order to test the accuracy of the statement that iodoform in connection with putrid matter exerts a retarding influence upon the development of bacteria, I proceeded in the following manner:

FIG. 1.



An agar-agar plate with three pulps (from calves' teeth), which had laid for over eleven months in iodoform. All three are enveloped in a vigorous growth of bacteria.

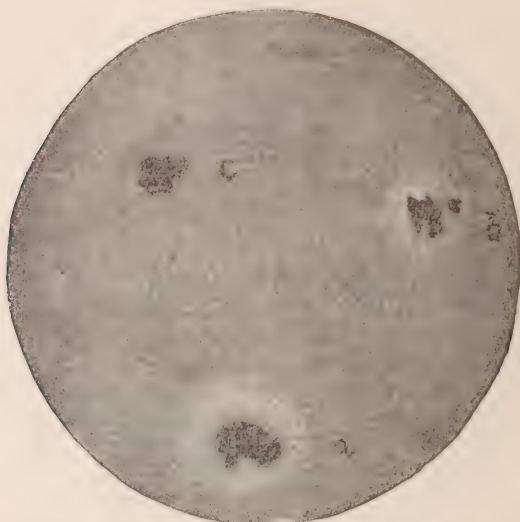
A number of pulps or pieces of pulps from calves' teeth were moistened with water, and kept at blood temperature until they had developed a strong putrid smell. They were then imbedded in iodoform and placed in the incubator. After three days, one of them was taken out and put upon a plate of agar, in the expectation that it would be found completely sterile. I was consequently somewhat surprised to find, after twenty-four hours, that it was surrounded by a broad rim of bacteria. The experiment was repeated after five, seven, eleven, eighteen, and twenty-six days, four months, seven months, and lastly after eleven months and thirteen days, always with the same result (Fig. 1). During the last seven months the pulp had been kept at room temperature. In this case we see that a contact of iodoform with putrid matter during the space of almost a year had not sufficed to devitalize the bacteria present.

In like manner a putrid fluid was shaken up with iodoform-powder and kept in the incubator. After twenty-six days, living bacteria were still found in it. The antiseptic action was consequently practically equal to nothing in these cases.

Also putrid pulps from human teeth, rolled in iodoform and placed at once, or after a few hours, upon plates of nutritive agar-agar, were found surrounded by a proliferous growth of bacteria the next day.

A method of experimentation which I have recently adopted has furnished some results worth noting. A very putrid, foul-smelling pulp was divided into about equal portions, one of these thoroughly incorporated with iodoform by working them together with a spatula, and placed upon a freshly poured infected plate of agar-agar. At the same time, the other portion without iodoform, and also a piece

FIG. 2.



An inoculated plate of agar-agar, strongly clouded by the growth of bacteria, containing : *a*, a portion of a putrid pulp mixed with iodoform ; *b*, the same without iodoform ; *c*, a portion of a healthy pulp with iodoform. The semi-transparent zone about *a* and *b* indicates a retardation in the development of the bacteria.

of a *healthy pulp with iodoform*, were placed upon the plate, to serve as checks or control experiments. One of these plates, as it appeared after it had been for two days in the incubator, is shown in Fig. 2. The transparent zone about the pieces *a* and *b* indicates a slight antiseptic action. It will be seen that the healthy pulp-tissue with iodoform (*c*) has exerted no retarding influence whatever, whereas the piece of putrid tissue incorporated with iodoform (*a*) shows an appreciable retarding influence. It is but slightly greater, however, than is shown by *b*, with which no iodoform was used.* Nor is it always

* I have frequently observed that pieces of putrid tooth-pulps dropped upon plates of pure cultures retard the development of the bacteria of the pure culture in their immediate neighborhood. This, however, is not to be wondered at, since we know that the poisons produced by one kind of bacterium may be fatal to another kind.

as apparent as in the case illustrated, sometimes being entirely wanting. If we compare its action with that of sublimate (Fig. 3, *a*), we see how very slight it is.

The results of a number of experiments have led to the establishment of the fact that pieces of freshly extracted putrid pulps, thoroughly incorporated with iodoform, sometimes acquire the power to very slightly arrest the growth of bacteria in their immediate neighborhood.

We must not, moreover, lose sight of the results of Behring's* researches, who found that iodine is liberated from iodoform only under the action of light and oxygen. In vascularized animal tissues the living cells may take the place of light, while the oxygen is furnished by the oxyhæmoglobin of the blood.

FIG. 3.



An inoculated plate of agar-agar containing: *a*, a portion of a putrid pulp mixed with sublimate; *b*, the same with iodoform; *c*, the same without any antiseptic. Note the extensive action of the sublimate. The dark zones about *a* are due to a precipitate caused by the sublimate.

In the root-canal, however, these two factors are wanting, and it is possible, therefore, that even the very slight antiseptic action which iodoform in connection with putrid matter appears to exert on pure cultures of bacteria outside of the human body may not develop in the canals of the roots of teeth.

3. *The antiseptic action of iodoform in connection with putrid matter in the animal body* was tested in the following manner:

A purulent or putrid pulp was cut into small pieces, and half of them incorporated with iodoform. These pieces, both those with and those without iodoform, were placed in skin-pockets at the root of the tails of white mice. After two to three days I took them out again, together with any pus which might be present, rubbed them up in

* *Deutsche med. Wochenschrift*, 1882, S. 278.

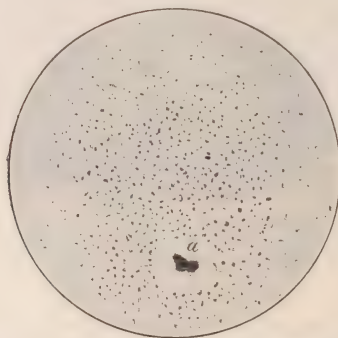
melted agar, which was then poured in the customary manner, and placed in the incubator.

I obtained the following results :

		Number of colonies which developed from the contents of the pockets.
1 pair	{ <i>a</i> , with iodoform.....	3400
	{ <i>b</i> , without ".....	3600
2 pair	{ <i>a</i> , with ".....	4
	{ <i>b</i> , without ".....	6470
3 pair	{ <i>a</i> , with ".....	47250
	{ <i>b</i> , without ".....	innumerable
4 pair	{ <i>a</i> , with ".....	45
	{ <i>b</i> , without ".....	innumerable
5 pair	{ <i>a</i> , with ".....	innumerable
	{ <i>b</i> , without ".....	innumerable
6 pair	{ <i>a</i> , with ".....	innumerable
	{ <i>b</i> , without ".....	innumerable
7 pair	{ <i>a</i> , with ".....	11700
	{ <i>b</i> , without ".....	innumerable

In most of the cases we see a considerable difference in the number of colonies in favor of those where iodoform was used,—a fact which, as we shall see below, is to be explained not so much by any antiseptic action of the iodoform or the iodine, as, according to my opinion, by the circumstance that in the pockets treated with iodoform the bacteria had much less nourishment, and consequently much less favorable conditions of development than in those where no iodoform

FIG. 4.



An agar-agar plate inoculated with the contents of an iodoformized skin-pocket. At *a* a small piece of pulp-tissue impregnated with iodoform has prevented the development of colonies in its immediate vicinity.

was applied. We occasionally observe on the culture-plates that the pieces of pulp to which iodoform still adhered were sometimes surrounded by a transparent zone two to three mm. broad (Fig. 4), which may be regarded as due to an extremely slight antiseptic action, although one must be cautious in drawing such a conclusion, since, as we have seen above, a similar appearance is often observed in connection with pieces of pulp that have not come into contact with iodoform (Fig. 2, *b*, and Fig. 3, *c*).

4. I have now to give the results of a series of experiments which were undertaken for the purpose of determining to what extent infec-

tions made with pieces of gangrenous tooth-pulps could be influenced by the use of iodoform.

The method of experimentation was practically the same as that described under 3, with the exception that the pathological instead of the bacteriological symptoms were studied twenty-four hours after the infection of mice by pieces of gangrenous pulps. I found, as a rule, that the cases where the pieces had been incorporated with iodoform showed more swelling than those where none was used. This result is not, however, to be attributed to a stronger inflammatory process in the former case, since a closer examination shows it to be due to the fact that the iodoform takes up the secretions of the wound, becoming more or less distended or puffed thereby. The skin around the wound has usually a good appearance, or is slightly reddened, very seldom discolored; while that of the control-mouse very frequently presents a bluish or bluish-black color.

On opening the pockets at the end of the second or third day, we find them, in cases where iodoform has been used, sometimes quite dry and rapidly healing; in other cases containing a small quantity of stringy, thick pus, very rarely showing any signs of decomposition. In case of the control-mice the quantity of pus will be found greater on an average, and it is very often thin, discolored, and has a putrid smell. The tissue at the bottom of the pocket, in what may be called severe cases, is also infiltrated with pus and in a process of dissolution.

The difference was not always as marked as in the cases just described; in some cases it was but slight. But the experiments so often turned out in favor of the iodoform, especially where very putrid material had been used, that its good effects could not be mistaken. I should not omit to mention that fifteen to twenty per cent. of the mice operated upon died from iodoform intoxication, notwithstanding the fact that scarcely more than six to eight milligrams (or about one two-thousandth of the weight of the mouse) of the powder was used in each case. The apparent antiseptic action of the iodoform, which is particularly noticeable in experiments 2, 3, and 4, must be accounted for, I think, in the following manner: Iodoform restricts the formation of pus by a paralysis of the protoplasm of the leucocytes (Binz), or, more probably, by a destruction of the poisonous chemical substances in the putrid pulp-tissue (de Ruyter, Behring). Furthermore, the iodoform, in absorbing at least a part of the secretions of the wound, exerts a direct desiccating action. The iodoformed pocket therefore offers an unfavorable culture-medium, principally on account of its lack of nourishment for bacteria.

This view is supported by the observation that wherever there was much moisture or pus present a corresponding development of bacteria took place, notwithstanding the presence of iodoform.

I must, therefore, for this reason, take the liberty to doubt the correctness of the assertion that the action of iodoform is to be accounted for by the *attraction* of phagocytes, which dispose of the bacteria, to say nothing of the fact that this view does not quite harmonize with the results of numerous bacteriological researches, or with the experience of celebrated clinicians, who have testified that iodoform *restricts* the emigration of the leucocytes.

In summing up the results of my experiments, I can only state that iodoform, either alone or in connection with putrid pulp-tissue,

or in the same connection under the influence of the living animal cells, has been found to exert directly but a very insignificant retarding action upon the development of bacteria, and in no case a devitalizing action; that it nevertheless exerts a very beneficial action upon wounds to which it can be freely applied, and *indirectly* a retarding action upon the development of bacteria in that it deprives them of the nourishment necessary to their proliferation.

We may draw the following conclusions from the results of these experiments for the use of iodoform in dentistry:

1. It is not to be recommended for putrid conditions of the root-canal, as its antiseptic action in this case amounts to about nothing, and we have a large number of much more serviceable remedies at our command.

2. As root-filling, also, iodoform has no advantage over any one other indifferent insoluble powder; on the contrary, it has the great disadvantage of its disagreeable odor. Only in the case where a large open apical foramen is present, it may be advisable to incorporate a little finely pulverized iodoform into the cement with which such canals should be filled, on account of its beneficial action upon the tissue about the end of the root.

3. In the treatment of exposed pulps, iodoform can only be expected to exert an influence if it can be applied to a comparatively large surface. Where, on the contrary, the pulp is only exposed at one point or in a very slight degree, and particularly where the opening is filled up with *débris* and pus, it will be next to useless to apply iodoform.

4. The application of iodoform in the treatment of periostitis, abscesses, and fistule also seems to me to be of little purpose. The remedy exerts its influence but slowly, even under the most favorable conditions, and must be applied in comparatively large quantities. It therefore seems very improbable that it should be able to act through the apical foramen in a measure sufficient to produce a beneficial effect on a periostitis or an abscess.

If abscesses and the like have been observed to disappear after treatment with iodoform, the result is principally due to the mechanical cleansing of the root-canal (*i.e.*, removal of the cause) which preceded the use of the remedy. It may also be partly due to the action of various other ingredients of the paste, but certainly least of all due to the iodoform itself.

In large wounds in the oral cavity, where the use of an antiseptic is indicated, iodoform takes a prominent position on account of its comparatively non-poisonous nature.

DENTISTRY FROM A SCIENTIFIC STANDPOINT.

BY MAX GREENBAUM, D.D.S., PHILADELPHIA, PA.

(Read before the D.D.S. Society, Philadelphia Dental College, December 2, 1892.)

KNOWLEDGE is obtainable through means of certain methods. One manner appertains to a method that invites speculation, formulates principles and generalities, and from these are carried out details. All this is mere speculation. The details that stand as deductions

have no substantiation that they are positively so, that they are correct. They appear to answer certain conditions, and hence are accepted as true interpretations.

When the early philosophers looked for the universal principle that would explain all phenomena, and finally resolved upon air, water, and fire as being the most universal, we have instances of this method of acquiring knowledge. They simply assumed. Their assumptions stood upon no positivities, and so had no positive value as far as fixed knowledge was concerned. Another method of acquiring knowledge, a method that stands correlative to the first, is to ascertain one fact, and from this one fact endeavor to build another, and so on; but no venture unto another fact is made before the first is firmly established, and no second fact assumed before it shapes itself. The result of that is science, or exact knowledge.

Let us view the progress of the world in its collective sense, or let us view any special department of knowledge, and we see that the greatest progress has been determined by the second course, where details were first looked for and worked out. No matter where we turn, this holds good. And with such force has this demonstrated itself, that inquiring minds no longer look for generalities from which to deduce details, but seek the details and then merge them into generalities.

From our standpoint as dentists, let us look into the dental world. The same condition confronts us. From a primitively crude calling, we have to-day a distinct profession. From the unscientific practice of indiscriminate extraction, we find to-day such practice among conscientious practitioners abandoned. From the first introduction of artificial dentures to the present results obtained in this direction,—marvelous! From all the theories that have been offered in explanation of the cause and action of dental caries, the starting-point of our pathology we may say, to the explanation of to-day, scientific in all its bearings, so has dentistry been evolved through inductive proceedings. Wherever we observe in our profession that the greatest growth has taken place, wherever it has spread its greatest applicability and utility, wherever it rests upon firmest basis, we find that such results have been brought about through investigations that were strictly scientific,—not mere speculations, but, by a gradual aggregation of facts, from one unto another. All this we have, and in its application we have the best results; yet is there much in our profession that is far beneath anything that can be classed as scientific, and herein we define our purport,—to contrast the scientific with the unscientific in dentistry; to contrast the results the scientific enforces with those of the unscientific.

When we make a plate we invite a series of operations that we know are correct, and that we know will do certain things precisely, and that in a general manner admit of no deviation. We take our impression, and we know exactly why we do it. We know of the different materials with which we take our impressions, that certain ones are better under certain conditions than others. We can truly say we know this, *and this knowledge is employed alike by all*. From our impression we produce our model or cast, and we know exactly why we do this; and so on do we continue from cause to effect, and from effect to a certain definite result. The proceedings are under

control of a knowledge that is strictly scientific, *and this knowledge is employed alike by all*, and must be brought to bear by all who desire to construct the denture.

Of course we understand that there are perhaps no two practitioners who make alike a plate in all the details ; but certain facts lie as a substratum, and these facts all must employ alike, and in so much the knowledge is scientific. Dentists recognize this as such ; but when we turn to other departments in our profession, the manner changes altogether. In operative dentistry the change is most apparent.

Dentistry, with a great number, in reality rests upon the practice to remedy the ravages of decay. When a patient presents for such purpose, scientific practice would determine immediately upon examination fitting treatment, and our knowledge in this direction should be based so accurately, because it is a direction that involves the functions of the dentist most directly, that all dentists would prescribe the same treatment, the best treatment, the best method of filling the cavity or cavities, the method the conditions indicate and require,—that would be scientific dentistry. But how much in contrast to this existing practice is, we need not go far to ascertain.

From statements of the ideas of dentists, as we read them in our journals, we find where one speaks of gold as the best filling-material, another decries it as the worst, and this is sufficient. This decided difference demonstrates that our profession, in so much, is not scientific. Scientific knowledge commands the same utterances, would prescribe alike ; there would be no difference in practice ; in fact, there could be none. Such contrast in statements as those heard would not exist ; how could they ? In dentistry, as in any other scientific knowledge, one thing alone could be correct under given conditions, and one answer alone forthcoming. Varied treatment for the one condition implies a fault. This is evident ; and now let us see wherein is the fault. Is it that operative dentistry must await further advancement, that as yet we have no scientific knowledge concerning filling-materials and their action when inserted in cavities ? Or have we this knowledge here, as we have it in other departments, and is the failure to accept operative dentistry upon a scientific basis but the failure due to a non-recognition of this basis ? To the unbiased observer the latter conclusion seems unavoidable.

From a knowledge of our literature we find that failure in filling-operations is due to infraction of what seem to many as certain set laws, and that success is equally due to methods in obedience to certain fixed laws. We find enunciated the law that "failure in filling-operations is due to incompatibility of filling-material with tooth-structure," a law that has become a law not only because empirical practice sustains it, but because *science* has established it. *This is a law*, and its violation degrades the practitioner to unscientific practice. No matter in what way we examine, it points in the same direction. Unavoidable as is this conclusion, it is of frequent occurrence that statements are made that gold is *the* material with which to fill cavities. That in many cases it is the best is true, but that in a very large number of cases it is the worst that could be used is likewise true, and therefore any attempt to place it foremost among our filling-materials without variance, and the practice that indulges in its use indiscriminately, is false and unscientific in the extreme.

The argument of capability in inserting gold, that may be adduced as a factor that has much to do with the success of fillings, becomes null and void. True, some can introduce better gold fillings than others, and the better operations, *providing everything else is equal*, will outlast the poorer. However, this is altogether apart from the point before us. We are considering a phase of dentistry that is outside of superiority in workmanship,—a phase that rests within positive laws, and through which we have positive knowledge, and this knowledge must be employed. The period of mere empiricism is passed. The dentist who is conscientious in his endeavors seeks the *truth*, and then follows it. The truth is the law that presents itself and proclaims that failure is due *not to defective filling*, but to *incompatibility of filling-material with tooth-structure*. This is the scientific basis upon which operative dentistry rests, and which, as it receives acknowledgment, will place dentistry where some other professions *cannot* be placed,—*within the folds of science*.

Leaving for a while filling-operations, let us contemplate another important aspect that forces itself before us in this conception of the advancement of our profession to what we understand as a science, that is as general in its misconception and as unscientific in the varied treatment imposed as is operative dentistry from the view of filling teeth. We have reference to canal-fillings. We accept that the gentlemen who advocate the various methods in this direction are sincere practitioners, and that their endeavors emanate from a desire to do good; still the general knowledge is unscientific so long as no fixed, positive, and universal treatment exists. From the extreme of immediate fillings, to the other extreme where the canal is treated indefinitely with innumerable canal-dressings and materials, we find the varied practice described as successful. These assertions are true. Success in treating root-canals may eventuate from many causes. Dentists who laud oxychlorid of zinc as being the best of all canal-dressings no doubt meet with success, and may in a fashion be justified in proclaiming it so strongly. However, their practice is as unscientific as is any other that totally discards environments. Before proceeding, let us see why. The pulp is the source of nourishment to the dentine, and, as a natural sequence, when the pulp dies the dentine is cut off from its nutrient supply, and its death follows. We know that the dentine contains about twenty-eight per cent. of organic matter. After loss of the pulp, the dentine and its contents disorganize, and the presence of dead tissue with its concomitants *eventually irritates the pericemental membrane*.

But under certain conditions this irritation may be so retarded that no irritation manifests itself. For instance, in a hard-structured tooth, with round single root and large free opening, if we extirpate the pulp thoroughly, which we can do easily, even though we carried the treatment no farther, or whether we filled that canal with oxychlorid or anything else, practice demonstrates the probability that no trouble will result. Yet here we must see it was not the treatment we indulged in that brought about the favorable condition, but the coincidence of fortunate circumstances; and though no trouble arise, still the treatment would be unscientific.

Having presented the favorable aspect, let us proceed to the unfavorable. The majority of teeth that require canal treatment are

multi-rooted ; upper molars very frequently, with such fine buccal canals as admit of no entrance, not even with the finest instrument used in dentistry ; lower molars with hair-like mesial canals that preclude the possibility of thorough removal of dead pulp-tissue. Are such canals to be filled with oxychlorid, or anything else that may prevent future venting ? Is it not unscientific to presume that trouble will not arise ? and when it does, how can relief be administered under such conditions ? On the other hand, is it not scientific to expect trouble, understanding the conditions as we do, and prepare the canal in such wise that any future irritating factor may be eliminated ? How can the argument be advanced that oxychlorid of zinc, acting antiseptically, prevents septic formations ? How can this material permeate that portion of the canal still occupied by unremoved pulp-tissue ? That it should do this seems beyond reasonable supposition.

There is yet another point that demands place in our argument, which is that those who claim that they fill the entire canal, and assert that this, together with removal of pulps, is a matter of easy accomplishment, must find frequent curvatures of roots and hair-like tenuity of canals, in association with which these claims appear improbable. Concluding then, as we must, that portions of pulp-filaments remain within such inclosures, how can the fact escape us that they will become irritants ? To say they will not is to discard all probability, all natural sequence, and declaim against known facts ; and if we conclude, as we must, that an irritation may manifest itself at some future time, are we not making matters direful by filling the canal in such a manner as precludes future entrance ? Is not any treatment unscientific that fails to enforce the condition that will permit of future venting ? The answer forces itself upon us, whether it be in single-rooted teeth where free and large openings can be effected, or in multi-rooted teeth where thorough removal of pulp-tissue is impossible.

It has been urged by unscientific fillers of canals that even though portions of dead pulp-tissue be left within the canal, the circulation which yet touches these parts is sufficient to prevent putrefaction of such portions. They claim, furthermore, that the activity or principle within living tissue, together with the phagocytic tendency of the white corpuscles, lends aid to obviate such difficulty. However, the circulation must be cut off from that portion of the remaining pulp that is dead, for were it not it would remain alive ; and although this may occur in sporadic cases, yet the theory that it invariably does so cannot be accepted. Failures that arise from irritation of the pericemental membrane attest too frequently that putrefactive changes take place within the canal, which, eventuating in alveolar abscess, show us clearly the condition. If we presume even that the statement, as made by some, that the pulp-tissue remaining slightly beyond the apex retains its vitality, the disorganization of the contents of the dentine is yet to be guarded against.

It is unreasonable to suppose that a living thread of pulp-tissue, like that which may remain beyond the apex, and which may retain its vitality, is sufficient to nourish the entire dentine ; and if not, then portions beyond the reach of aliment die, and the same condition, although on a smaller scale, supervenes. Thus upon inquiry and impartial consideration of conditions as they exist we arrive at certain

conclusions, providing we desire to keep within the bounds of scientific treatment.

Before examining these conclusions ultimately, let us contemplate another point that is somewhat apart. It is frequently asserted that carbolic acid and creasote are used with success. Let us see whether they can be enfolded within scientific dentistry. The action of carbolic acid and creasote, although highly antiseptic and germicidal, and in these respects highly satisfactory, yet produces a state contrary to what we desire. If we place a drop of carbolic acid on albumen, it will produce a hard coagulum. Carrying this effect to the root-canal, we find that either of these medicaments produces thorough coagulation on the surface wherever they touch. This precludes venting the canal when the changes which produce an irritating factor have taken place within the dentine, and which, unless removed, will induce an inflammation in the pericemental membrane.

Having considered the point that stood somewhat apart, we are within definite and ultimate conclusions relating to canal-dressings. From whatever direction we approach, we come to the same method. That method is to cleanse the canal well with medicaments that act antiseptically and are germicidal, and yet produce *little* coagulation, and prepare ourselves in such manner that vent may be afforded to that canal should trouble arise. Having assumed what the scientific procedure is in distinction to the unscientific, let us contrast the scientific result with the unscientific. When teeth are cared for in accordance with known laws, then the results are most favorable. To be able to decide in what case to use a certain filling is the office of the dentist. Temperaments that have as a base the bilious or sanguine, whether modified by each other or whether in less degree modified by nervous or lymphatic attributes, may be classed under cases that permit the use of gold. Such teeth are good and strong, and gold fillings here will maintain their integrity almost a lifetime. Here is where the gold-worker may build and work without restriction or limitation, and experience will confirm the stand of scientific knowledge that these fillings will last.

On the contrary, the indiscriminate use of gold in teeth of temperaments that are largely nervous or lymphatic leads to failure. Almost every day such teeth can be seen with gold fillings that have dark valleys surrounding them, denoting failure, even though the fillings were inserted only two or three years previously. These are the teeth that show the sacrifice unscientific practice imposes, and corroborate the laws of scientific knowledge. Proceeding from filling cavities of decay to canal-dressings, the same definition takes place. Practice based on knowledge of facts leads to positive results, and permits guarding against formidable factors. Let us suppose, for illustration, an upper molar where pulp-devitalization has been completed, and we are called upon to fill. We extirpate as thoroughly as we know how, or can; we force our antiseptics as far as we can, and fill with oxychlorid or chloro-percha. Can we conscientiously, with proper information that we are supposed to possess, say to the patient that trouble will not arise, or can we say as much as that the tooth will remain comfortable for two or three years? Anything but that.

And now, when in a year, two, three, or more, irritation about the roots tells us what the trouble is, how can we administer relief? It

cannot be done. Either the irritation must terminate in an abscess, or else we must extract. There is no other possibility. But if, instead of using oxychlorid, we understand dentistry and practice it from a knowledge that is scientific, we bring about an altogether different result. We insert our finely rolled cotton saturated with an essential oil, and instruct the patient to return the next day, and so we proceed to systematically prepare our canal until no odor is perceptible, and then our final treatment takes place; and as we insert our last cotton dressing or inspissated canal-paste, and as we cover the rootal entrance with a layer of temporary stopping, and then fill the cavity according to conditions, the satisfaction is always present that we are masters of the situation, no matter what may arise. Step by step the same knowledge that shows us in such forcible manner what is likely to take place, guides us in combating the likelihood when it arises and presents itself. That is the end of accurate knowledge, to *enforce mastery*, not only to the great comfort of the patient, but likewise to the fostering of the highest aim and noblest endeavor, which is to place dentistry *within the folds of science*.

SOME OF THE LATEST PHASES IN IMPLANTATION AND OTHER OPERATIONS.

BY DR. W. J. YOUNGER, SAN FRANCISCO, CAL.

(Read before the Second District Dental Society of Brooklyn, N. Y., Dec. 12, 1892.)

MR. PRESIDENT AND GENTLEMEN,—With your permission, I will reverse the sequence suggested by the phraseology of the title, and begin with the "other operations."

The first case that I shall offer for your consideration is an operation devised by myself, to prevent the facial deformity that always attends a fistulous opening from an alveolar abscess through the cheek. The culprit tooth was a left inferior molar.

As a preliminary operation the abscess was tapped through the roots by widening the canals, and the abscess thoroughly cleansed, first by injections of warm water, and then by a 2-1000 solution of bichlorid of mercury. These liquids were then forced in the same rotation through the fistula in the cheek, from inside out, after which the whole of the diseased surfaces were treated to an injection of Churchill's solution of iodine. This was repeated three times, in as many different days, by which time active suppuration had ceased and the surface of the fistula in the cheek presented a healthy granulating appearance. An incision was then made between the cheek and the jaw, cutting down not only through the fistula, but for an eighth of an inch beyond, in front and below the margin of the indurated ring that is so characteristic of this lesion. A little necrosed surface of bone was discovered, which was promptly scraped away. After thoroughly washing the wound with a warmed 1-1000 solution of the sublimate, a slightly wedge-shaped layer of cotton—in appearance like the side or flap of a saddle—saturated with wax was introduced between the cut surfaces and retained to the teeth by ligatures. Thus these surfaces were kept apart and forced to heal, each one independently of the other, and the cheek allowed to resume the

rounded appearance it had before the disease had perforated it. You may ask why the roots of the tooth were not extracted. The answer is, Because their retention was necessary to prevent a serious gap in the jaw, which could not have failed to produce a depression on the external cheek. Besides, the roots treated and cured, and the surrounding diseased structures restored to health, an important, good, and serviceable tooth would be restored to usefulness.

The second case that I have to report to you is one of restoration of two inferior centrals in a lad aged nine, four days after they had been knocked out by a fall, and exposed to the sun and night air for two days and four hours.

Master Walter R., the son of a well-known clergyman of San Francisco, whilst running in play during the noon recess at school, fell, and striking a wooden peg in the ground, knocked out his two lower central incisors, making an ugly cut in his gum and shattering the outer wall of the alveolus, several fragments of which were broken off and exfoliated. Dr. King, now president of the California State Dental Association, was consulted. He advised the parents to find the teeth that had been knocked out, and bring the boy to me. The accident occurred at the noon recess of Wednesday, and the teeth were not found until four o'clock on the afternoon of the Friday following. On Saturday, the patient, with the teeth in his hand, was brought to me. I found that the roots had not yet completed their growth, the foramen being very wide and the walls quite delicate, but they were fairly covered with pericementum. I then placed the teeth in a solution of two and one-half per cent. of carbolic acid. On Sunday morning I prepared the teeth for replanting by removing the pulps, filling the canals with Hill's stopping, and finishing the apices with Slayton's gold and tin preparation. They were then placed in a 1-1000 solution of the bichlorid, whilst the gum was being anesthetized with the cocain preparation. The gums were still congested, and the portions of the socket left intact were filled up with new tissue. I therefore had to cut these granulations out and slightly deepen the sockets in the jaw itself. The teeth were then restored to the mouth, and kept in position by silk ligatures. I was somewhat anxious about the result of the operation for fear of the laterals, then only a quarter grown, pressing into the shoulders of the replanted teeth and lifting them out, or pressing them out of position in the process of their growth and development. I therefore relieved the lateral pressure by filing from the propinquitous surfaces of the deciduous cuspids, thus creating a space into which the laterals might press if crowded. The planted teeth became quite firm, and so translucent and natural in appearance that no one would suspect that they ever had been out of the mouth. The laterals, however, seem to be growing very slowly, especially the left one, and I suspect that the process of growth has been retarded by the shock of the accident and a possible lesion.

Case 3 is a very singular one, a young lady, otherwise well formed and very bright and intelligent, but without cheeks. That is to say, the thick cushion of tissue which lies between the buccinator and the skin was absent, leaving a rigid hollow depression where a smooth convex roundness should have been. The orbicularis oris was well formed, and stood out prominently at the commissures in consequence of this depression. While the face was in repose, only these particu-

lar features were observed ; but instantly that a smile was attempted, the muscles attached to the corners of the mouth, especially the levatores angulorum oris, stood out very prominently. Had the young lady been vain as well as intelligent, she would never have smiled.

A plaster impression was taken of the jaws and teeth tightly closed, and from this was made the apparatus which took the place of the lacking cheeks, and, by proper grooving in the line of the levatores, prevented those muscles from undue prominence in the risorial effort. The apparatus was attached to the upper second and third molars, and gives great satisfaction.

The treatment of pyorrhea alveolaris by the method recommended by myself to you some years ago is meeting with unabated success in my hands. Teeth hanging by apical attachment only have been rendered firm, and the tissues of the diminished sockets made so to contract and unite with the roots that an instrument could not be introduced between them without force and causing pain and bleeding. I am satisfied that an attachment takes place in these cases, otherwise the teeth could not become so firm and the gum and tissues of the socket cling so to the tissues of the root. This may possibly be thought to furnish some proof to the opponents of my theory that "a pericementum is necessary for attachment in cases of implantation and kindred operations" ; but the gentlemen must not lose sight of the fact that the condition of a tooth whose vitality has never been impaired by extraction is quite different from one that has had its sanguineous connections severed, and has to have restored to it, through superficial means, that circulation which the other possesses through undisturbed pericemental attachment at the root, and with the pulp still in full life and activity, even through its capillary ramifications to the surface of the cementum. It is therefore an easy matter for direct union to be established between these healthy, living tissues, when the partition of calculus is thoroughly removed from the root, and a granulating surface produced in the envioning soft tissues of the gingivus.

This brings me naturally to the operation of implantation. I am happy to state that this operation has entered upon its eighth year of life, with nearly three-quarters of the teeth implanted and of record in the first year and a half of the operation still in perfect or serviceable condition. I would like to ask the gentlemen of this convention and of the profession throughout the world who have been stigmatizing implantation as a failure if their own operations, viz, fillings, crowns, bridge-work, and dentures, can show an equal or superior success at the end of seven years?

Some months ago a gentleman who is a wine-taster by profession, and who for many years has been engaged in the selection and blending of wines, came to me to have his upper jaw filled with implanted teeth. His upper teeth had all, with the exception of the left cuspid, been lost through the ravages of pyorrhea alveolaris, and this solitary remnant of a lost tribe was itself very shaky in its diminished socket. He had been wearing a vulcanite set for several years, and as he was unable to taste with sufficient accuracy with the plate in his mouth, he had to remove it every time he plied his profession. This subjected him to considerable mortification, and beside he was conscious

that his senses of taste and odor were not as delicate as before he had to resort to the artificial dentures. He therefore came to me to have natural teeth once more growing in his mouth, and be thus enabled to cast away his plate. I have so far planted four teeth, the incisors, and will soon continue the process of restoration until a set, ending with the first molar, will be completed. Since these teeth have been planted and the plate discarded, he says his old taste and sense of smell have returned, and, he added with glee, that all of California and much of the civilized world would be benefited by the operation, as they will have better wines to drink. Another direction in which implantation will benefit humanity!

It now affords me great satisfaction to announce that the theory of persistent vitality in tooth-structure which I have promulgated in connection with the attachment that occurs in implantation, and which has been so denied, denounced, derided, scoffed at, and pooh-poohed in California, New York, Boston, London, Paris, Berlin, and other scientific centers, has at last been verified with a proof that must be accepted by all honest scientists.

In October, 1886, I was presented with a number of teeth which had been extracted at various periods, more or less remote. One of these teeth, a central, I transplanted in a lady's mouth in Dr. Kingsley's office, New York. On the following day I discovered a perpendicular crack in the tooth extending from the cutting-edge to the cervical margin, which promised to disfigure the tooth. So I removed it and substituted another in its place. On July 31, 1889, two years and nine months later, I implanted this same cracked tooth in the mouth of a physician of San Francisco. It was one of three teeth that I implanted, the gentleman having had the two centrals and the left lateral knocked out by a piece of an exploding gun in a charge during the war. He had therefore worn a partial gold plate for over twenty-five years. This central was the only tooth that would match, and the doctor did not mind the crack, as he said, "It is not for beauty but for service that I want the teeth." The crack, however, kept on lengthening and deepening and widening until about the middle of last year, when the tooth split in two, high up into the root. The left half was the loose half, but it clung firmly to the gum; so the doctor pressed it against the other, the rigid half, and kept the two portions together by a silk ligature. Last November, having secured a suitable tooth, I tried to remove the root whole, but with all my care it broke near the apex. On the portion of the root grasped by the forceps I discovered a thick covering of pericementum, the cementum and dentine underneath looking as bright and healthy as in a sound root extracted for the first time. I immediately dropped the root and crown into an equal mixture of alcohol and water, and, corking the bottle, telegraphed for Dr. F. O. Jacobs, a microscopist of reputation lately arrived, and highly recommended to me as being very skillful in this work by Dr. J. Taft, the dean of the Dental Department at Ann Arbor. This gentleman had announced in a lecture given by himself a few evenings before, at a meeting of the local society, "that a tooth once extracted became dead, as he had never seen any evidence of prolonged or continued life in such teeth." I therefore felt pretty sure that with his prejudices against my theory, if after a thorough investigation he should decide that the membrane

that seemed to my unassisted eye to be pericementum should be such, and the life-like appearance of the cementum and dentine be due to vitality, that I could rest well assured of the truthfulness of my doctrine. I will now give you the result of his investigation and the story told by the two slides that he prepared for me, as stated in his letter to me as follows :

SAN FRANCISCO, CAL., November 23, 1891.

DR. WILLIAM J. YOUNGER :

Dear Sir,—I have carefully examined the specimen of implanted tooth you gave me, and find the pericementum firmly attached at a part of the tooth near the cervical portion, covering quite a large portion of the cementum. A part of the tissue was detached and mounted on a separate slide.

It has been shrunken considerably by the use of clove oil and a little over-stained by acid carmine, but for all that shows structure very nicely.

The dentine and cementum were not blackened, to my surprise, as is always the case in a dead tooth. This indicates that the tissues (hard as well as soft) were still alive.

Very truly,

(Signed) F. O. JACOBS.

Of course, if the fact of renewed vitality has been discovered in one single instance, it is sufficient to establish the theory, for the failure to prove this in other investigations only shows that the conditions were not proper, and therefore not to be considered as relevant.

I wish now to report two operations in transplantation conducted according to the plans formulated by the German scientists.

These gentlemen have been trying experiments with dogs' teeth in dogs' mouths, and they have come to the conclusion from their observations with their canine subjects that the operation of implantation, transplantation, and replantation can be made successful. *But the pericementum*—that membrane I value so highly and believe all-important—must be carefully scraped off, as being not only worthless but prejudicial to success, the tooth sterilized by soaking for a week in a two and one-half per cent. solution of carbolic acid, and then treated to a bath of a 1-1000 solution of bichlorid of mercury. One has even suggested that the tooth be boiled for an hour in a solution of sal soda, one ounce of the salt to a pint of water. By these methods they gravely assure us that attachments will promptly take place, and that no absorption, the bane of these operations, will occur.

As I am not a microscopist, and as the intense and continued strain on my sight required by my daily work forbade my prolonging this strain by studying microscopy, I have had to depend upon the investigations of those who are experts in this science, trusting to their intelligence and love of truth—the basis of all science—to prove my theory, or determine, should I be wrong, the real nature of attachment between tooth and socket, especially in teeth that have been long extracted. The results of their investigations, prior to that made by Dr. Jacobs for me, have not been very flattering ; yet while unshaken in my convictions, I felt that these scientists were too elevated to be swayed by prejudice, and that their taking so diametrically opposite grounds to mine was the result of conclusions honestly reached by intelligent experimentation and investigation. I therefore felt that I should at least put the results of their investigations and advice to the test, which I did.

The first case was the transplantation of a superior central incisor

into the mouth of the wife of a physician. The tooth was splendidly organized, the root dense and shining and without a particle of pericementum. It was sterilized for one week in a solution of two and one-half per cent. carbolic acid, and over night in the 1-1000 solution of bichlorid of mercury. The pulp was removed from the roots by drilling into the pulp-canal through the lingual aspect of the crown, through which aperture the canal was subsequently filled with prepared gutta-percha, and finished at the crown-opening with cement. The socket was then prepared, and the tooth inserted and held in position by silk ligatures. No swelling ensued, and the gum healed around the tooth splendidly. Everything betokened success, and at the end of five weeks I removed the ligatures. I congratulated the lady, and she went off rejoicing. In one-half hour she was back with the *tooth in her hand!* The motion required in eating luncheon had dislodged the tooth, and it dropped into her mouth. On investigation, I found that attachment had never taken place, as the surface of the socket nearly to the apex was covered by a continuous membrane, and *absorption had already commenced at the apex of the root!*—the very thing these German scientists had stated would not occur!

A week after this operation I transplanted a double-rooted bicuspid in the mouth of a gentleman who had four successful implantations, of three and one-half years' standing. This bicuspid was treated identically as the central of the first case. Immediately on the failure of that operation, I sent for this gentleman. I at once removed the ligatures, that had then been on four weeks, and using slight traction the tooth came out, there not being any attachment. The surface of the socket was covered, as in the other case, with membrane, and *absorption had commenced on the ends of both roots.* In both cases the sockets were denuded by the ammonia treatment, and teeth with roots well covered by pericementum were inserted. In four days I removed the ligatures for examination in both cases, and found attachment had taken place. In one month the teeth were firm in their sockets, and have been in constant and satisfactory service ever since, with the promise of lifelong utility.

Now, in face of the immediate failure of the operations conducted on the plan of the German scientists, and the occurrence of the resorption which they announced would *not* take place in such cases, and the immediate success of the operations conducted on my theories following their failures,—what are we to think? There is but one solution that occurs to me by which we may explain and reconcile to reason and honesty the falseness of their assertions, and that is, that their experiments and deductions have been made with *dogs' teeth in dogs' mouths*, while mine have been made with *human teeth in human mouths!*

If they had experimented on the *genus homo* with the organs of the *genus homo*, I have no doubt they would have reached conclusions much nearer my own. We must consider how different the systems of the animals are, how oppositely affected by the same causes, natural and artificial,—how, for instance, the hog cheerfully chews up the rattlesnake whilst the reptile is viciously injecting into his hide the venom “that has such enmity to the blood of man,” but is impotent as water in the substance of the porcine; and the strychnine, that is so poisonous to animals generally, his pigship

will enjoy with the relish that the ordinary man has for the bitters in his cocktail. The heat that causes the perspiration to flow from a man's and a horse's skin forces the sweat instead out of the cow's and the dog's tongue, etc.

It is not always wise, therefore, to predicate with certainty the result of an operation on a human being from the outcome of a similar operation on an inferior animal ; and especially is this so with organs whose evolution and structure are different. Hence the absurdity of deducing laws for implantation of teeth in the human mouth from results obtained in the jaws of dogs or of any other inferior animal ; and, somehow, that line of Pope's rises suggestively to my mind,—

“The proper study of mankind is man.”

HEALTH AS A POTENT FACTOR IN PROFESSIONAL SUCCESS.

BY GEORGE F. EAMES, M.D., D.D.S., BOSTON, MASS.

(Read before the Massachusetts Dental Society, Boston, July 10, 1892.)

HEALTH is a relative term. It may be good, poor, strong, or weak. To illustrate this, we may make use of an earthen pitcher, in the handle of which is a crack ; by reason of which, however, neither appearance nor usefulness are completely destroyed, as the vessel still retains its shape, and the handle may be used to carry the pitcher *half full* of water.

The vessel serves its intended purposes, with the qualification that it becomes limited in capacity and slightly marred in appearance. With careful usage and light service it might remain serviceable for a long time ; but an attempt to carry it *full* of water would result in a broken handle, and its usefulness as a pitcher would at once be gone.

Likewise a person in weak health may possess a body in which all its functions are perfectly performed, or, as long as surrounding circumstances are conducive, in which certain work is faultlessly done, provided it is not too great for its strength ; but if he be overworked or unduly exposed, the feeble organism yields and is impaired or ruined.

Very little argument is needed to establish the fact that good health is important to the successful pursuit of any vocation, and I hold this to be peculiarly true of dentistry.

In order to substantiate this assertion, it does not seem necessary to show that the practice of dentistry endangers the health.

The subject under consideration does not require us to deal with the outside habits of dentists, and we are at present only concerned with the practitioner while he is actively engaged in his professional work. But for a moment it may be interesting to view the dentist as he appears the world over,—a sort of composite picture, if you please, of the representative dentist, with all his good habits and bad habits of life thrown into an average. How does he look ? Let us make two comparisons : First, presupposing a high standard of health, what is his physical appearance, his nerve-tone, his digestion ? Secondly, how does he appear when compared with other professional men ?

In the first instance, I imagine the contrast would be surprisingly

great, while the comparison with other professional men would show no great difference in the degree of health ; in fact, the insurance companies put all professional men in one class as to mortality.

I have examined statistics with the object of ascertaining the mortality of dentists as compared with other professional men, but have been unable to institute such a comparison. Prominent insurance officials in New York and Boston inform me that they are aware of no such statistics, and they all agree, moreover, as to the unreliability of the present statistics of the comparative rate of mortality in different vocations. I am indebted to Sheppard Homans, president of the Providence Savings Life Assurance Society of New York city, for valuable suggestions and for his paper on "Longevity," from which I wish now to quote :

"In modern times we have the records, more or less authentic, of many persons who have attained extreme old age. Mr. John Easton, of England, published in 1792 a list of one thousand seven hundred and twelve persons who had reached the age of one hundred years and upward, and in 1826 Mr. Charles Babbage made a similar one of one thousand seven hundred and fifty cases.

"The following is from a list prepared by the late Cornelius Walford, containing the names of two hundred and eight persons, all of whom attained the age of one hundred and twenty years or more :

"Thomas Cam, Shoreditch, England, at the age of two hundred and seven, in 1588.' This case is said to be confirmed by the parish registers. If this be true, it is the most remarkable instance of longevity recorded since the flood.

"Buffon, the celebrated naturalist, first enunciated the theory that the natural life of all animals bears a certain relation to the periods of their growth. This period is defined by the union of the bones with their epiphyses. When this union takes place, the bones, and consequently the animals themselves, cease to grow. M. Flourens, accepting this ingenious theory of Buffon, and having the advantage of later and more correct physiological knowledge, made a series of very interesting experiments by which to determine the length of time after birth when, in cases of different animals, this union of the bones with their epiphyses takes place. He then found that the natural limit of life in all animals is about five times the period of growth.

"Thus the union of bones and epiphyses and the consequent natural life of different animals is as follows :

"Man grows 20 years ; natural life 100 years.

"Horse " 5 " ; " " 25 "

"Dog " 2 " ; " " 10 "

"Buffon states 'that the man who does not die of accident or disease lives everywhere to ninety or one hundred years of age.'

"Hufeland says, 'Nearly all those deaths which take place before the hundredth year are brought on artificially ; that is to say, by disease or accident.'

"Long life has at all times been the chief desire, the principal earthly aim, of mankind. How can it be secured ? These are questions which have always engaged the attention of the deepest thinkers.

"Perhaps the most interesting and instructive example of the

ability to prolong life and preserve health is given in the writings of Luigi Cornaro, a wise old man who owed his century of existence to a strict adherence to the principles of sobriety and moderation.

"Cornaro was born at Venice about the year 1465, though the exact date of his birth is variously given. He died April 26; 1566, at Padua. He began life with a bad constitution, and a long course of excesses had, by the time he reached the age of thirty-five, reduced him to a state of extreme misery. For four or five years he remained in constant bodily suffering. Gout began to lay hold of him, and he was tormented by pains in the stomach, together with perpetual feverishness and thirst. His physician pointed out to him that his chronic ailments must have their cause in his habitually disordered life, and urged him again and again to reform.

"He was long convinced of the truth of this before he began to heed their advice. For a while he pretended to follow it, still eating and drinking as before, and concealed the fact from his doctors,—‘as all patients do,’ he adds with some humor.

"At last he formed the strength of will to adhere strictly to the diet and mode of life prescribed for him, and at the end of a year he found himself, instead of a broken-down, hopeless invalid, unfit for either work or enjoyment, a healthy and singularly active man. He then came to the natural conclusion that the regimen which had overcome the effects of excesses and repaired the natural weakness of his constitution must be the one to maintain good health; and from such strict regimen, during all his remaining sixty years of life, he but very rarely swerved.

"He had more than completed his eightieth year before he sat down to write his own experience for the benefit of others. For forty years he had lived a life of almost unbroken health and happiness, a life which contrasted as vividly with that which he had led in his earlier days as with that which he saw commonly lived by others around him. One consideration weighed upon him especially: the value of the later as compared with the earlier years of his life. Many men, he argued, by the time they had acquired the knowledge, judgment, and experience which qualified them for usefulness, are, in consequence of their careless habits of living, physically worn out. Men who might live in full possession of all their faculties to the age of ninety or one hundred pass away at the age of fifty or sixty.

"Cornaro's regimen, which consisted of eggs, soup, bread, pancakes, and such food, with wine, was, as he tells us, chosen for himself alone. All people, as he reasoned, should live temperately; but the temperance of one man may be the excess of another. Cornaro's method is the simple one, which each man should find out for himself,—namely, what is the quantity of food and drink suitable for himself,—and live accordingly. Cornaro finishes his first ‘Discourse’ thus:

"‘Such is divine sobriety, friend of nature, daughter of reason, sister of virtue, companion of noble, modest, temperate, regular life, and strict in all its actions. It is the root of life, of health, of joy, of address, of skill, and of every action worthy of a noble mind.’”

Mr. Homans also says, “I would add that in my opinion every

person, at least every one who is not afflicted with organic trouble, or who has not too long neglected the observance of the laws of nature, has within himself the power to prolong his own existence, as well as to improve and secure his own good health. In life insurance we find that the best risks are not the most robust men, not the athletes, but the men who, without organic trouble or inherited tendencies to disease, are yet obliged to take care of themselves,—men who, like Cornaro, ‘live with sobriety.’”

It is not necessary to show that the practice of dentistry is in itself extremely injurious to the health as compared with other professions; but if evils exist it is wise to point them out, that they may be avoided, and to suggest the remedies, that they may be applied.

I have recently sent out about two hundred circular letters to prominent dentists who have had ten years or more of experience. Certain questions were asked for the purpose of obtaining suggestions in the preparation of my address; and I wish, just here, to return my sincere thanks for the kind and ready response to such inquiries, and for many accompanying letters of suggestion and approval of my investigations. These have been a constant stimulus to me in my work.

Is dentistry a healthful occupation? Yes, and no. If compared with other professions, yes; if considered in itself, and in view of the way the average dentist has to work in order to gain a livelihood, no. I received answers to the above question in this ratio: fifty-five per cent., yes; forty-five per cent., no. If one can limit his hours at the chair to five, and raise his fees in a corresponding degree, this, with consistent hygienic living, will insure to the ordinary physical constitution, good health.

But all cannot do this. Therefore, accepting the situation as it is, let us try to obtain a clear view of it, and if possible suggest some palliative or remedial agents.

I will try to give you the essence of the combined answers which came in response to the questions sent out. Two have already been considered. Many dentists never take a vacation; for those who do, one month is the average time, judging from the answers received. In regard to the maintenance of good health, nothing especially new was offered, the observations being included in ordinary hygienic laws.

As to causes originating in operative dental practice, which tend to undermine the health, very decided answers were obtained. There was a nearly unanimous response that one cause is found in the position at the chair,—often stooped, strained, and maintained for hours at a time. Also another conspicuous cause is “nerve-strain.” To quote from one answer which I received: “The stooping position while operating, the nervous strain and exhaustion consequent upon too many successive hours at the chair, and the drain upon the vital forces.”

Overwork, poorly ventilated offices, and irregular meals were often mentioned; but this may of course be incident to all other sedentary and professional occupations. In regard to avoiding the breath of patients, a few mentioned the use of the rubber-dam. Many use no especial means. One suggested placing in the nostrils cotton saturated with an antiseptic, in bad cases of nasal catarrh. The majority keep

out of range of the breath, this being easier for those who make constant use of the mouth-mirror.

May I be allowed just here to venture the opinion that many dentists underrate the evil of inhaling the breath of patients. Impurities are inhaled, which quickly enter the blood. A comprehensive view of the situation shows the dentist in close proximity to different patients, breathing poisonous gases and germs for hours, days, and years. Some diseases are communicated through the breath, and it behooves every dentist to avoid it by every means in his power ; to frequently stand erect, filling the lungs with air, and to take regular breathing exercises in open air.

The average number of hours at the chair, based upon the answers given, is a fraction over seven. On a basis of one hundred answers, thirty per cent. sit while operating. By this we do not mean that the operator sits all the time, but alternates between sitting and standing, at his convenience.

This completes our consideration of answers to the formal questions, in which we have called attention to some of the dangers to be encountered, some of the evils to be avoided, and a suggestion as to the demands upon the body. Now, what further demands are made upon the dentist? What should be his qualifications? If you do not hold me to very close reckoning in this matter, I should say that no other profession or pursuit demands so great a variety of accomplishments. In other words, the ideal dentist is the embodiment of innumerable qualifications which are requisite for other professions, but not a few of which are peculiar to his own. *And these depend upon good health for their efficacy.* In fact, the demands upon us are such as to require that we feel, not tolerably well merely, but entirely free from irritability, and full of vigor, buoyancy, and determination.

The dentist assumes and maintains a strained position at the chair, calling for athletic powers, while at the same time he performs a dental surgical operation requiring a nicety of touch delicate in the highest degree. He is excavating near an exposed pulp, or trimming frail enamel-margins, or excavating dentine ; or he is called to see a patient from whom his fine physique and gentlemanly address win respect and give assurance ; or he is called to perform a dental operation more difficult than the amputation of a limb, in which strength and gentleness, firmness and sympathy, skill and knowledge are all requisite. In fact, a dentist needs the suppleness of body and strength of an athlete, together with the delicacy of touch, deftness of fingers, and swift movement of a woman.

Again, his ingenuity and surgical skill are taxed equally in the splitting or fracture of a tooth, or the jaw on which it is placed. What far-reaching and accurate judgment is required in determining the probable amount of tooth-movement, changes in the articulation, alveolar disease, caries, etc., as a matter of prognosis by which the future course of treatment may be determined. The moral rectitude, knowledge, and skill necessary to treat a case of pyorrhea alveolaris properly have scarcely yet been estimated. Now if you are not feeling well, the result is the pyorrhea cases are slighted, and the details of the preparation and filling of a cavity are less scrupulously observed.

I would call your attention to a report in the Transactions of the

American Dental Association in 1872, by Dr. L. D. Shepard, from which I quote as follows :

"It is well known that dentists, as a class, break down early in their practice if kept busy at the chair. If this confinement is varied by laboratory work, it gives relief and rest ; but to the practitioner who is entirely occupied hour after hour in filling teeth, the strain is terrible. Very much of this is the result of standing in an unnatural position."

Dr. Shepard further says that the practice of our profession is exhaustive to both mind and body, and that the habit of sitting while operating has saved him the necessity of quitting practice. He gave what is claimed to be the first clinic illustrating the use of the stool, as made by him, before the Massachusetts Dental Society in 1865 or 1866.

Dr. Marshall, in the *International Dental Journal* for June, 1892, says, "The wear and tear upon the vital powers of a busy dentist is greater than upon any other class of professional men, the physician and surgeon not excepted."

In making suggestions for promoting health, and thereby our success in practice, I wish to refrain from numberless lengthy hygienic laws with which you are entirely familiar. Articles have been written on this subject, and text-books on physiology are always at command.

Fellow-practitioners, we do not need instruction in physiology ; but we do need something that will arouse us, that will stimulate us to put into actual practice well-known hygienic laws.

Many have reached such a degree of physical indifference that the suggestion of a hygienic regimen meets with repugnance, and especially since the prevailing influenza has cast its widespread and poisonous influence among us the feeling of lassitude has been quite general, and there is an indisposition to do the very thing which would give us more life and vigor. I now wish only to call your attention briefly to two things : first, the power of mental discipline over the various functions of the body and mind ; second, the position at the dental operating-chair.

Happy is the man who can determine what shall occupy the energy of his nerve-centers, whose brain is not at the mercy of ideas popping in and out at random on change of surroundings or the lightest remark or trivial occurrence. For instance, as to study (for the dentist assuredly must study), there is often some special subject-matter which needs concentrated and continuous attention ; but the mind wanders here and there, and it takes twice the time required were he able at once to concentrate his attention. The same applies equally to hours for meals and sleep. Have you such control over your mind that only pleasant and cheerful thoughts shall occupy it for the time being, so that appetite and digestion shall be promoted ? Have you the power to dispel intruding subjects of the day's experience, pleasant or unpleasant, continually banishing them until you enter the land of Nod ? If so, other things being consistent, you shall have that sound, refreshing sleep which the dentist especially needs.

As to the position at the operating-chair, the examples which follow will need but little explanation. I present these illustrations and

FIG. 1.



Fig. 1 shows the position often taken (by one who always stands on the right side of the chair) in filling a left superior bicuspid.

FIG. 2.



Fig. 2 shows the same, with the exception that the chair is raised and tipped back, with the operator on the left side, using the left hand.

FIG. 3.



Fig. 3 shows a position often assumed in operating upon the palatal surface of a central incisor

FIG. 4.

Fig. 4 differs from Fig. 3 only in the chair being lowered, and the operator working by reflection in the mirror.



FIG. 5.

Fig. 5 shows the same operation, the work being done with a direct view, but with the improvement over Fig. 3 in the chair being tipped back, and the use of the stool.



FIG. 6.

Fig. 6 shows the same as Fig. 5, with the exception that the operation is done by reflection in the mirror.



remarks not only because of a conviction that the subject is of great importance, but for the reason that many written answers that came to me laid stress upon the *cramped position* at the chair.

I have watched the students operate in the dental college, and have observed experienced practitioners also, only to strengthen my belief that the dentist often assumes and maintains a position which is strained and tiresome, unnatural and unhealthy. I am equally persuaded, however, that these positions are unnecessary ; but to improve upon them requires thoughtfulness in this direction until it becomes a habit. It is true that the uncomfortable or tired feeling, the ache, will often remind us that we are in an undesirable position ; but this is after we have lost an amount of strength and vitality which cannot well be spared.

I have selected a few of the positions which I have had photographed,—enough, I think, to sufficiently illustrate the principle (see pages 114, 115).

I therefore submit that the cultivation of the use of the mirror, the stool, the left hand, the pedal and levers of the chair, is an important aid to health and professional success.

Especial care has been taken that the various positions be not exaggerated, and surely they ought in themselves to convey the lesson which was intended.

ORTHODONTIA.

BY FRANK FRENCH, M.D.S., ROCHESTER, N. Y.

(Read before the joint meeting of the First and Second District Dental Societies of the State of New York, at the New York Academy of Medicine, December 13, 1892.)

THE late Dr. Amos Westcott, of Syracuse, to whom the dental profession owes a large debt of gratitude, used to say the best way to treat a case of irregularity of the teeth was to send it to some other dentist. If you cannot do this, then take your impressions, make your models, take plenty of time to study the case, decide upon the best plan to pursue (but do not tell your patient, for the chances are you will change it half a dozen times), then estimate what it will be worth, and do this upon a very liberal basis, then double your estimate, and you will always find you have lost money.

Irregularities may be either congenital or acquired ; those belonging to the latter class result more from thumb- and lip-sucking than from other causes, and the congenital, in point of numbers, being much the greater.

Taking the law of heredity as a standpoint, also the fact that as a race or nation the American people have the most irregular teeth of any people in the world, I have often asked myself the question, Why is this so? and have evolved for myself a theory which I feel sure is more or less true, but have never had time to follow out and prove it.

Nowhere on the face of the globe are there so many nationalities represented as in America ; these different nationalities not only mingle freely, but they literally mix, flow together as it were, and by

marriage and intermarriage the original type is lost, and we get certain results which make the work of the dentist more arduous. One of these is crowded dentition, resulting often in great disfigurement. Take, for instance, the Scandinavian and the Teuton: one with narrow jaw and small teeth, the other with broad jaw and correspondingly large teeth. They marry, and their offspring are pretty sure to have the large teeth of one parent and the small jaws of the other, producing an unsightly, crowded dentition; or the small teeth of one and large jaw of the other, which is far more unsightly, and reminds one of the teeth we used to cut in pumpkins to make jack-o'-lanterns when we were boys. Fortunately, the cases of the latter are few as compared to the first; can any one tell why? Also, it occurs more frequently in the male than in the female; can any one tell why? We are thankful it is so; but what law of transmission produces it?

A part of my theory was that the Americans had the most irregular teeth, because of the mixing of nationalities; next the English, then French, Germans, Spaniards, and so on; the nearer we approached the original national type, or nations who kept themselves within themselves and did not intermarry, the less irregularities, until congenital irregularities disappeared altogether. And if irregular dentition existed, it was acquired. The Italians have quite regular teeth, and do not often marry with other nations. The same may be said of the Swedes and Danes, also the Chinese and Japanese. Dr. W. C. Barrett says that among a number of skulls of ancient mound-builders, there is scarcely a trace of irregularity; that the most regular dentitions he ever saw were among the skulls of Sandwich Islanders; that in several hundred of them there was scarcely a departure from the normal type. He also says that he has seen bad cases of irregular teeth in the skulls of native tribes of New Zealanders, Sioux and other Indians.

Now we know that the ancient tribes of New Zealanders and Sioux were very fierce and warlike, and I think that the cases of irregularity were far more likely to have been acquired than congenital. A dentist who spent three years with the Sioux says he does not remember of ever seeing teeth irregular enough to be noticed, and this after generations of mixing with the whites. I do not feel inclined to abandon my theory, and hope to be able to investigate it more thoroughly.

The literature pertaining to orthodontia is rather limited, and is confined mostly to Kingsley, Farrar, Talbot, and Guilford, who published books in the order named, and whose works contain enough to make the careful student able to apply or adjust the various appliances to suit his particular case. While there can be no certain rules laid down which one can implicitly follow and attain success, still there are certain principles involved, which, accordingly as we are governed by or depart from them, assist or retard our success.

These are laid down so plainly, and yet cover the whole ground so thoroughly, by Guilford in his book that I cannot refrain from quoting them. He has put them in italics, but I would print them in large capitals:

“1. The greatest good can be obtained from any force only when it is exerted in a direct line with the movement desired.

“2. The force used must be sufficient, but not excessive, and not be too abruptly applied.

"3. The points of resistance and delivery of the force must be fixed points.

"4. The resistance at the point from which we exert pressure must be greater than the resistance to be overcome by the pressure.

"5. It should always be seen to, in advance, that there is sufficient space to accommodate the tooth in the new position it is to occupy.

"6. Pressure may be either constant or interrupted.

"7. Pressure should be exerted as nearly as possible in a line at right angles to the long axis of the tooth.

"8. Always avoid, if possible, extracting any of the six anterior teeth in the superior arch.

"9. In the lower jaw one of the incisors may sometimes be extracted to gain space.

"10. Back of the anterior teeth, if all are equally good and one must be removed, select the one nearest and posterior to the one out of position.

"11. If a tooth other than the one nearest to that in malposition be defective, and not too far distant from point of irregularity, extract it instead.

"12. If a tooth must be lost, either to allow a more important one to fall into line, or to create space, it should be done without delay to accomplish the best results.

"13. If a tooth must be removed on one side to obtain space, it does not necessarily follow that its mate on the opposite side should also be extracted.

"14. Where there is disparity in size between the two jaws, and two teeth need to be extracted from the more prominent one, it would be a serious mistake to extract also the corresponding teeth in the other and smaller jaw.

"15. Needless extraction should be carefully guarded against.

"16. If a crowded arch calls for or will admit of expansion to advantage, do this in preference to extracting."

This is a somewhat lengthy quotation, but I could not omit one, as all are equally important. Each and every one, if carried into detail, is a theme for a lengthy paper that would not only be interesting, but highly instructive; they contain the basal principles which should govern all cases of treatment of irregularities. Every dentist who has these firmly fixed in his mind, and has sense enough to know when and how to apply them, may consider himself master of the situation.

How much valuable time has been wasted, how much harm done to patients, and alas! how many dentists have imperiled their immortal souls, by not properly understanding these simple rules. The greatest care and judgment are necessary in the application of force to the teeth.

If the force be too small, the results desired are not obtained, and valuable time is lost. If too great, it may result in a fracture of one of the alveolar plates, a broken blood-vessel, or a congestion of the pulp at the apical foramen, causing its death. I consider the application of too much force in orthodontia as the most serious error to be guarded against. I know that rapid movement is one of the fads (so to speak) of the present day, but I am conservative or old-fogy enough to believe that, generally speaking, it is far better for the results to be attained to take six months to move teeth, instead of six weeks. I

have seen many of the anterior teeth with dead pulps, and consequently dark discoloration, presenting a most unsightly appearance, which could only be attributed to too rapid movement, caused by too much force. Let us consider for a moment how this is caused. A tooth can be moved in any direction, by causing absorption in the direction you wish it moved. This is caused by pressure against the tooth, which produces compression of the periosteum on the opposite side from which the force is applied. This causes irritation, and starts the osteoclasts or giant cells in their work of demolition; as the tooth advances, a space is left behind, and the osteoblasts begin their work of building up. If the force used is too great, the blood-supply is cut off, and the pulp dies from strangulation. Is it not far better to take a few weeks or even months longer, and avoid this?

Again, as the absorption proceeds more rapidly than the reproduction, there is not so much space left in the rear of the tooth by the slow process as there is by the rapid one; the tooth does not need so much bolstering to retain it in position, and is not nearly so liable to return to its former position.

I know that many of our best operators use the "rapid-transit" methods, but I confess that I am afraid of them. Again, as to the application of force, it should be applied, if possible, in a line at right angles to the long axis of the tooth. Why? Because if applied at an angle either above or below, the tooth is liable to be pushed deeper in the socket, thus shortening it, or to be lifted a little, elongating it. If too much force is applied in either way it may result in death of the pulp, another point in favor of Sir Matthew Hale's motto, *Festina lente*,—"Hasten slowly." Unless the tooth (or teeth) being used as a point from which force is delivered is stationary, we will often find it has moved by the pressure applied instead of the irregular ones, and instead of correcting the irregularity we have created a new one.

Congenital orthodontia is much harder to treat than acquired, as the forces of nature are all against us, and the teeth are more liable to return to their former position.

The kind of appliances to be used must be determined by the judgment of the operator, and fortunately we have quite a list to choose from; but whether we choose levers, jack-screws, rubber plates and ligatures, piano-wires, any or all of these, we will often find our skill and ingenuity taxed to the utmost to accomplish the desired result.

Among the various accessories which have been devised to assist the dentist in his treatment of dental irregularities, the use of piano-wire occupies a prominent position. Dr. Jackson seems to be able to use it in most, if not all cases; but we are not all Jacksons, and should make ourselves familiar enough with all methods to be able to use any which the exigencies of the case may require. I will cite one case and its treatment, and show some of the appliances used.

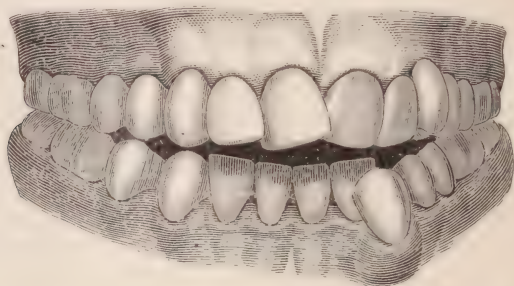
Miss H., of Rochester, aged eighteen, congenital irregularity. Mother, aunt, and grandmother quite similar, but not nearly so pronounced. The lower incisors and cuspids were quite irregular, the left cuspid being pushed out and forward. The upper teeth, beginning with the bicuspids, began to project, and at the median line projected nearly half an inch over the lower (see Fig. 1), making it difficult to close the lips and causing an unsightly disfigurement of an otherwise very pretty girl. As the first right lower bicuspid had

been extracted several years before, I at once removed the first left lower one, and here my troubles began.

The left cuspid was considerably out of place, both forward and outward. I fitted a cap of platinum to it, with an eye or loop on the posterior surface, banded the second bicuspid and first molar with one band, letting it come just over the edge of the grinding-surface so that it could not work into the gum. A hook was soldered on both lingual and buccal surfaces a little back of the space between the molar and bicuspid, and the cap fastened on the cuspid with cement. A rubber ligature was attached to the hook on the lingual surface of the band; this was drawn through the loop on the cuspid and attached to the hook on the buccal surface, and I thought I had it sure; but I was mistaken,—it had me, for after waiting patiently for at least a week I discovered that the molar and bicuspid were moving forward to meet the cuspid, which had not moved at all.

I removed the band from the bicuspid and molar, and lengthened it so as to take in the second molar, and again attached my ligatures; this time they all moved, that is, the bicuspid and first and second molars moved, but the cuspid did not stir. Now, here was my error.

FIG. 1.

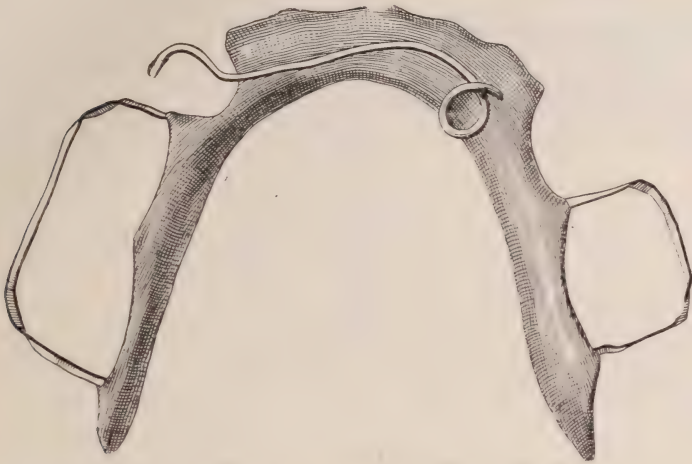


The points from which the force was delivered were not so strong as the point of resistance; still, I think almost any one would have made a similar mistake, as three teeth ought to have greater powers of resistance than one. I then made a rubber plate, with gold clasps around the bicuspids and molars on both sides, as they were in position and I did not wish to move them, and attached a spring of piano-wire with a single coil, starting from the posterior surface of the right cuspid, passing back of the incisors, and ending with a loop at the point I wished the left cuspid to occupy (see diagram, Fig. 2). I then attached with a silk ligature the wire loop to the eye on the cuspid, drawing it as tight as possible, and this time something moved, and it was the cuspid. I soon found, however, that this was drawing it in too much, and not moving it backward as far as necessary.

I then made another rubber plate, the same as number two, but with a longer spring extending from the right sixth-year molar to the left one, but without any coil, and ending in a loop (see diagram, Fig. 3). I attached this loop to the loop on the cuspid by a silk ligature drawn tightly, so as to give tension to the spring, and the tooth was drawn into place without further trouble. I used silk ligatures instead of rubber, because the wire spring gave all the tension necessary. I

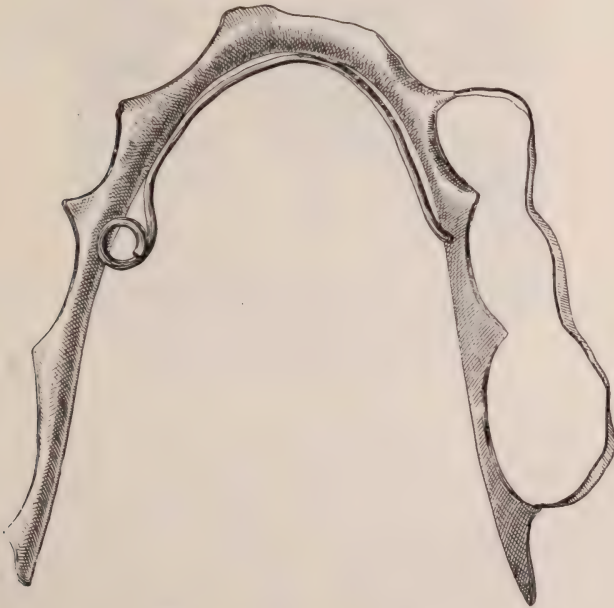
placed small pin-heads on the plate, on both labial and lingual surfaces, at proper points, and attached rubber ligatures from lingual to

FIG. 2.



labial pins, passing between the teeth, and the incisors and right cuspid were readily moved into position. The rubber plate extended in

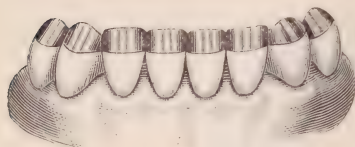
FIG. 3.



front of the lower teeth as well as in the rear, but is not shown in the diagram. The lower teeth being now in position, I swaged a thin

plate of gold, covering the cutting-edges and extending downward on labial and lingual surfaces about one-eighth of an inch from bicuspid to bicuspid, including both, and cemented it firmly in position (see Fig. 4).

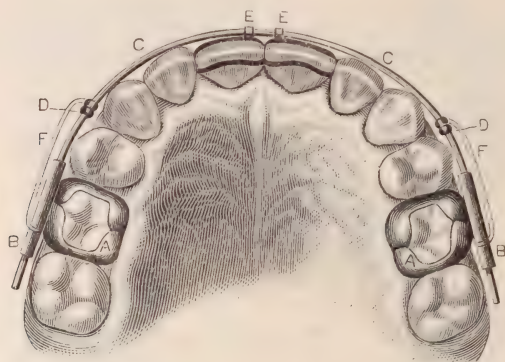
FIG. 4.



I then extracted the first bicuspid on both sides of the superior arch, for as all the teeth were equally good there was no choice in that respect, and it gave one less to be moved on either side. Then an accurate im-

pression of the first molar on either side was obtained, and a platinum band swaged so as to fit closely and coming up over the grinding-surfaces a little (A, A, Fig. 5). On the buccal surfaces of each, and running at right angles to the long axis of the tooth, was soldered a gold tube about one-half inch in length (see B, B, Fig. 5), and the band fastened firmly to the tooth with cement. A piece of gold wire, No. 18, long enough to reach around from second molar to second molar, was bent so as to form an arch of the shape desired for the teeth when in position, and fitted accurately to slide in the tubes on the molars and

FIG. 5.



yet move easily (C, C, Fig. 5). At a point just in front of the bicuspid a narrow tube of gold was soldered on the gold wire (D, D, Fig. 5). A narrow band of platinum was swaged to fit each of the centrals, and a small groove of the same material was soldered to each band at right angles, a very little removed from the median line (E, E, Fig. 5). This was to prevent the gold wire from slipping up or down, and also to hold another part of the appliance in position.

The wire was then placed in position, as seen in Fig. 5. A piece of heavier gold wire was then bent so as to conform somewhat to the shape of the mouth when closed, extending a little beyond the corners of the mouth and ending in a hook at right angles to the face. Exactly in the center, and at right angles, a piece of gold wire was soldered with a groove at the farther end to fit the arched wire already in the mouth, and of sufficient length to allow the lips to close readily when this was placed against the tooth (see Fig. 6).

A silk traveling cap was adjusted to the back part of the head, two

pieces of elastic braid were fastened to each side, one above and one below the ear, so that when brought together at the angle of the mouth the tension would be equal, and a small eyelet fastened in the end of each. A short rubber band was looped around the regulating bar, just in front of the small tube, brought back and hooked over the end of the bar at this point (F, F, Fig. 5). The pressure from this rubber was not great, but was sufficient to retain what space may have been gained. The front bar was then placed against the regulating bar, the saddle resting against it at the median line, the elastic bands from the cap hooked to each end of it, and I had something that worked nights and Sundays.

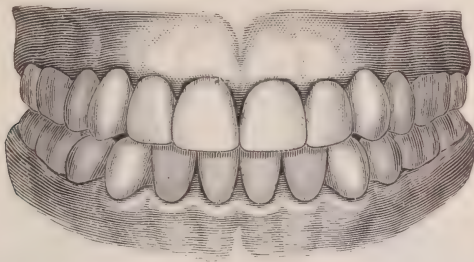
FIG. 6.



The pressure from this appliance was so great and got up so much inflammatory action that she was instructed to wear it only at night, the rubbers at each end retaining what had been gained.

This appliance was worn until the teeth were in position, presenting the appearance seen in Fig. 7, and the young lady was "a thing of beauty and a joy forever." A retaining appliance was fitted; and now a word about retaining appliances. I believe they should be made as light as possible, and retain the necessary strength. I also believe they should be made non-removable as a rule, for I think

FIG. 7.



they do the work better. Wherever I can, I use a small gold wire swaged so as to fit as closely as possible the labial surfaces of the teeth. A piece of platinum is then swaged to fit the first or second molars (as in Fig. 5), whichever may be used. In this case, bands were also fitted to the two centrals; then all the bands were soldered to wire (see diagram, Fig. 8) and cemented to the teeth, and worn without removal for a year; after that, worn nights for six months to insure safety.

This kind of a retainer is not inconvenient for the patient, does not look badly, and is cleanly. I use round wire instead of half-round,

because there is less substance in contact with the teeth, and it is more easily kept clean.

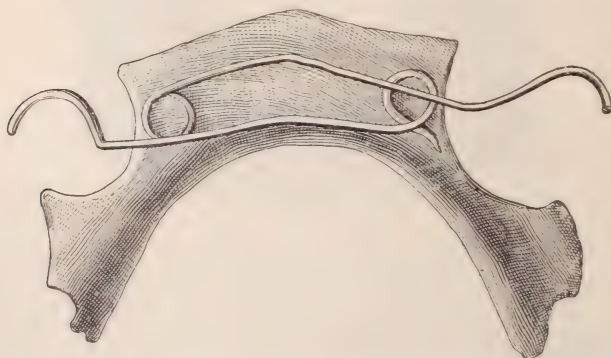
The diagram Fig. 9 shows an appliance used to bring two lower cuspids into position with wire springs and plate. No. 10, a plate and wire spring, where movement of the teeth was necessary on one side

FIG. 8.



only. No. 11 is a combination of Dr. Patrick's appliance and a rubber plate. The plate is made to cover the posterior teeth, and small screws are placed in the buccal surfaces, the yoke fitted to them and fastened there by small nuts, which also clamp the bow-spring, which can be

FIG. 9.



lengthened or shortened by these nuts. It is much easier fitted than his collars or loops, and can be removed with little trouble at any time for cleansing.

The hooks and other appliances are readily applied for moving the teeth outward, and the inclined planes and blocks for moving inward.

FIG. 10.

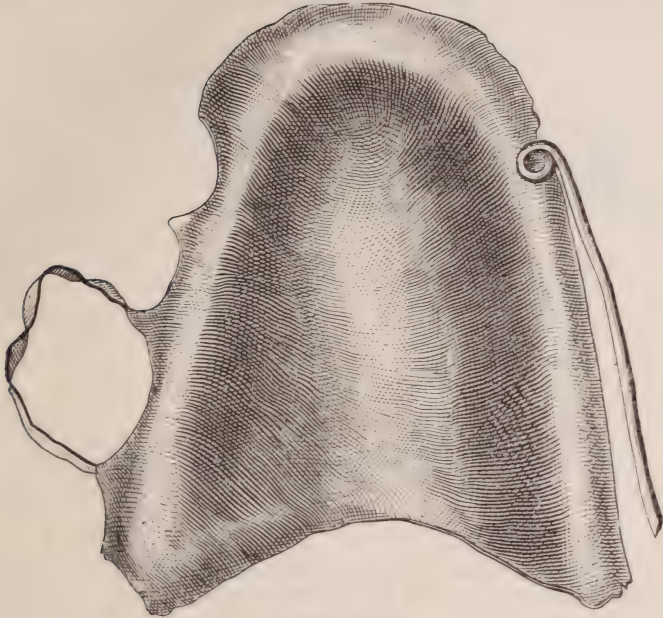
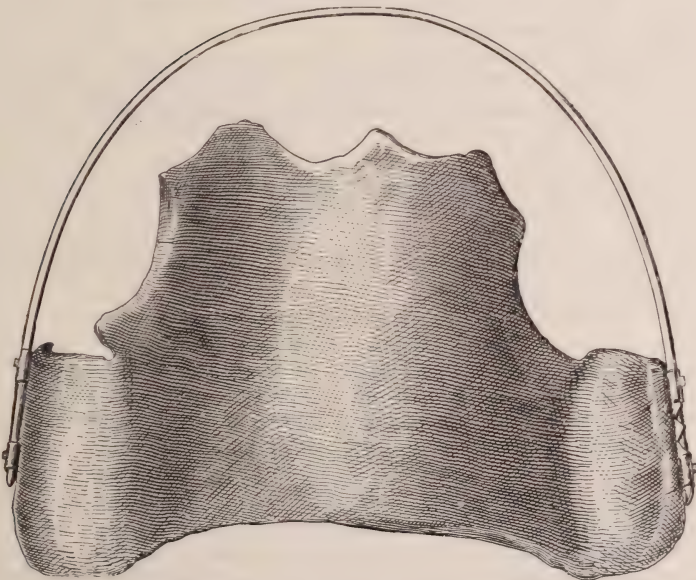


FIG. 11.



It has another advantage : If it is desirable to apply a rubber band to move the tooth backward or sideways, by placing the pin or fixed point a little farther back and cutting a little groove in the rubber toward the tooth, the band will not slip off, or, worse still, work under the gum.

Fig. 12 shows the central incisors at an angle, and Dr. Downs, of Owego, has a very simple method of regulating them, by taking a very fine line or cord, making a loop, and drawing the ends through the loop; then placing one on each incisor with the loop at the distal surface, the ends are drawn tight and tied. The moisture tightens the cord, and causes sufficient tension to move the teeth. It of course would need changing daily. The line or cord is known as No. 0 white re-laid grass line, and is sold by Abbey & Imbrie, 18 Vesey street, New York.

FIG. 12.



Dentistry, like medicine, is working into specialties. Let us hope that in the near future orthodontia will be one of them. Then what pleasure will fill our hearts as we refer all these cases to the specialist in this department.

POST-MORTEM TREATMENT OF THE DENTAL PULP.

BY OTTO ARNOLD, D.D.S., COLUMBUS, O.

(Read before the Ohio State Dental Society, December, 1892.)

FOR many years it has been the custom in conservative surgery to remove dead from living tissue, that the latter may not be encumbered by disease at the triumph of the former. This has been for a long time the accepted practice, and I know of no evidence at present indicating a revolution in custom.

In conservative dentistry the same law prevails,—not because of a desire to imitate, but for the reason that it is known to be philosophical and in accord with natural principles and laws, therefore it is scientific. Speculative phenomena are not truly scientific, unless their cause and effect may be accounted for.

In the generally accepted treatment for the devitalization of a dental pulp, and the subsequent management and preparation of the pulpcanal for its permanent filling, it seems to me we have well-nigh reached perfection, theoretically at least, and that the principles involved convey comprehensive and philosophical conviction.

To more clearly state my proposition, I will illustrate by a brief analysis. A case presents for your consideration, in which is involved an exposed tooth-pulp. For reasons satisfactory to yourself, devitalization of the pulp is agreed upon. Believing in arsenious acid as a devitalizing agent, you proceed to apply it, observing the usual precautions throughout your manipulations, dismissing your patient for two, six, or twenty-four hours, as in your judgment seems best. At the appointed time the cavity is unsealed and results investigated. You discover no sensation in the pulp, and thus far are satisfied; accordingly as anatomical relations are favorable or not you conclude to extirpate the pulp at once, or defer the operation for a more convenient season. After the pulp has been extirpated, you fill the canal with a suitable substance, either at once or later, using your judgment to the best interest for the case in hand.

There is nothing chimerical or speculative about the process from

beginning to end. It is the outcome of years of progressive experience, and is accepted as a rational and conservative method wherever modern dentistry is known. It seems nothing short of assumption for any one to defend a system that has so thoroughly stood the test of time, and given such beneficent results.

But we are now confronted with a proposition in practice, or a method that is directly opposed to the principles of surgical science, which omits what we believe to be the most essential feature, viz, the removal of the dead pulp. I therefore choose to appear as an adversary of the latter, rather than as a defender of a rational and accepted theory.

Briefly described, the details of the method are as follows : Cobalt, to which has been added eight per cent. of hydrochlorate of cocain, is applied to the exposed pulp, and allowed to remain two or three days, then removed, the cavity cleansed from decay and disinfected. Then the coronal part of the pulp is amputated by a large sharp bur, rapidly revolved in the engine hand-piece. The pulp-chamber is then washed out with a one-tenth of one per cent. bichlorid solution and dried. Now a loosely rolled cylinder or ball of tin or gold foil is placed into the pulp-chamber, directly upon the pulp-stump, and with a smooth burnisher revolving in the hand-piece burnished firmly to place.

This in substance is the method that Dr. Herbst, of Germany, submits to the dental profession for approval and indorsement. How far he may succeed depends in a great measure upon the susceptibility of individual members of the profession to adopt, without investigation, doctrines that contain irrational features wholly inconsistent with scientific facts. I venture, however, the assertion that conservative dentists of this country at least will be slow to retrace their steps and abandon methods which are definite and positive in results, for this German method, which promises nothing good definitely, but much evil indefinitely. Chemically, arsenic and cobalt are practically alike, with different degrees of potency only ; the terms may therefore be used synonymously. The addition to either of cocain may modify pain, but adds no prophylactic properties whatever. Now, if there were any doubts concerning the destructive action of arsenic upon organized tissue, if it acted merely as an anesthetic and only temporarily suspended sensibility in the pulp, we might have reason to expect a return of function in the future, in which case there would be only a change in environment, provided that during the period of vital suspension the cavity had been filled. However uncertain we may be as to the manner in which disorganization takes place, we most certainly do know that arsenic kills ; and if there is any reorganization, it is accomplished only on the other side of Jordan, from whence we have no definite returns.

We also know from abundant evidence, clinically at least, that a dental pulp subjected to arsenic is not rendered immune against septic and bacterial influences. If arsenic established immunity, there would have been no occasion to change the method practiced more than fifty years ago by Dr. Spooner and his confrères, who first employed arsenic for destroying tooth-pulps, immediately following the process by filling without removing the pulp, and using indiscriminately all substances by any of the then known methods,—and

this was before the advent of the dental mallet. But as pericemental disturbances and alveolar abscesses subsequently appeared in most cases so treated, and failure upon failure followed sooner or later, it finally dawned upon these gentlemen that the *post-mortem* disposition of the pulp was an important factor, and proved beyond all doubt that while in its normal state it existed in perfect contentment, after death it made things very uncomfortable unless appropriate obsequies and a foreign burial-place were provided.

I doubt not that in Dr. Spooner's practice many cases thus treated remained comfortable for a long time, and perhaps others continued so throughout the life of the individual. But extraordinary conditions do not establish rules, but exceptions. We cannot lose sight of the natural agencies inherent in living tissues, and their power of combating and arresting destructive tissue-metamorphosis. The processes of encystment and absorption are well-known types, often providing the only safeguards against rapid and extensive tissue-degeneration. Most of us, perhaps, are familiar with unexplainable conditions at times, but these must all be classed as exceptions, and they furnish no reliable basis for rule in practice.

A few years ago, when pulp-capping was more extensively practiced than now, the most unpromising cases sometimes survived the treatment, and seemed to prosper indefinitely, when by accident perhaps the pulps were later discovered dead; and yet the usual evidences of the true condition were never apparent, because nature kindly tolerated the abnormal state. But this is not the rule, and we should be grateful for the rescue rather than accept it as an inevitable sequence, and refrain from imposing upon nature too frequently. Has there been nothing gained from these clinical facts? If I know nothing more, I surely have learned to select my cases more carefully when I practice pulp-capping.

Pulps often die from accidental causes in perfectly sound teeth, remain for a long time inert as it were, but ultimately assert their power, and must be removed for the benefit of health and comfort. We surely believe that a pulp within a sound tooth is more thoroughly protected from septic infection than one once exposed and covered by a filling, no matter by what method it had been inserted. Air-tight fillings, of whatever material, do not render a dead pulp immune from bacterial infection. It must be removed, and just in proportion as this is thoroughly or partially done, you induce the establishment of a condition that will generate trouble sooner or later.

There seems to be no definite rule governing the interregnum between death of the pulp and the period when this fact is made manifest by subjective or objective symptoms, or both. Indeed, the prolonged immunity from discomfort that is sometimes experienced after the immediate or local disturbance following violence has subsided, likewise the immunity sometimes following pulp-capping, furnishes the only basis of hope for advocates of the Herbst or similar methods. This variation in the course of time is due to systemic conditions, depending upon the inherent power of resistance or the *vis vitæ*. But more often symptoms of pulp dissolution rapidly appear, and prompt surgical interference is demanded to arrest the evil.

Decomposition of unsterilized dead tissue is an inevitable conse-

quence, whether it be of a part or the whole of the body. The same may be modified in character, however, by the influence of specific bacteria. Pathologists have for a long time recognized, in blood-vessels of cadavers, the presence of a gas which did not seem attributable to the ordinary *post-mortem* decomposition. This has given rise to much speculative theorizing in the past, and has recently led to the discovery of a micro-organism that seems destined to clear the mystery. This micro-organism, *Bacillus aerogenes capsulatus*, so called, was discovered and cultivated in the pathological laboratory of Johns Hopkins University and Hospital, and is reported fully in their "Bulletin" for July-August. Experiments with cultures upon live rabbits gave interesting and valuable results that may be significant to the student of dental pathology,—viz, in none of the animals inoculated was there any evidence manifested of the gaseous condition or presence of bacteria during life; but shortly after they were killed,—by violence, of course,—gas and bacilli were rapidly developed. In one case only, that of a pregnant rabbit, the injection proved fatal, which at the autopsy was found attributable to the remarkable fact that two of the embryos in the uterus were already dead when the injection was made.

Upon the strength of such evidence it does not seem altogether unreasonable to recognize a pathological analogy between dead tooth-pulps and dead embryos, and we might safely attribute the presence of gas in the dental canal at times to the same agencies. It may at least help to solve the problem in those cases that develop most rapidly, and to my mind the difference is only in extent. At any rate, a dead tooth-pulp is a disturbing element to the adjacent tissues, inasmuch as it becomes a focus for the colonization of bacilli that multiply rapidly and carry destruction in their wake. When this occurs, nature's sanitary forces, the leucocytes, muster in large numbers and hasten to the spot in battle array, and a contest begins. Leucocytes attack bacilli; in turn becoming phagocytes, they devour bacilli and keep up the good work. But, alas! bacterial fecundity is too prolific, and the ranks are recruited more rapidly than they are devoured, and it is only a question of time when our friends are overpowered and the enemy is victorious.

My friends, it is against nature to act as a burying-place for dead tissue; at most, she may by her power of resistance defer for a time the climax and tolerate the imposition. If you would seek to lay a foundation for success in tooth-conservation, let your motto be—Dead pulps must be removed. Take no chances by imposing too much upon nature.

I am fully aware of the difficulties we often encounter, and of the obstacles that are sometimes insurmountable and render it physically impossible to remove the pulps completely in all cases presented. I have toiled often and long in search of an opening into the buccal roots of superior molars, and had only my labor for the pains. Again, at the last moment, when about to give up in despair, I have found a long-sought-for canal.

I need not describe here the obstacles that often prevent a thorough removal of the pulp from anterior root-canals in inferior molars; but there must be a standard of perfection, and I insist upon honest endeavors to reach it. We cannot at this time go backward half a

century, nor welcome obsolete methods. Science is progressive, and in dentistry we propose to keep apace. It seems hardly necessary to rehearse before this audience methods and processes in detail for removing the dental pulp. If there are any seeking light in this direction, I can do them no better service than to commend for their reading an article in the October (1892) DENTAL COSMOS, one of a series on filling teeth by Dr. Ottolengui, wherein the subject is treated most thoroughly and rationally.

However, as it would be inconsistent to ignore altogether the subject as implied in the title of this paper, I will at least note some of the principles that I consider important in the treatment for the removal, if you please, of devitalized pulps, and some of the aids that have benefited me in this kind of work. The first condition I desire is cleanliness within the cavity made by decay, and about the instruments used. The next step is to secure access to the canals, even at the expense of good tooth-structure. Manipulative ability is always impaired by obstruction of light and approach. Access obtained, proceed to introduce into the canal a barbed broach, which has been sterilized by dipping in creasote, passing it along between the wall of the canal and the pulp-tissue. When the apex has been reached, gently rotate the broach until the sense of touch indicates to your mind that the tissue has become entangled upon the instrument, then gently withdraw it with the pulp adherent.

In all reasonably straight roots with symmetrical canals, wherein the pulp-tissue has not reached an advanced state of disintegration or a putrefaction, this will usually accomplish a complete removal of the pulp.

In posterior teeth, and particularly in the anterior canals of inferior molars, I have found Donaldson's adjustable broach-holder a valuable aid. In all difficult cases, I know of no better aid to your manipulations than an inexhaustible supply of patience, accompanied by a determination to succeed in the undertaking. When, however, all has been done, and your manipulative resources have become exhausted, with failure to entirely extricate the pulp, you may resort to some of the pepsin preparations, packing the canal full, frequently changing the same, which in time may digest the dead tissue left in the canal; or, as a last resort, leave the canal alone, filling the crown-cavity with an easily removable temporary stopping, and await developments. When pericemental inflammation or its symptom appears, the canal may be reopened, treated antiseptically, and subsequently closed permanently; taking it for granted, however, that in the multiple-rooted teeth all canals had been previously filled from which the pulps were removed.

The consideration of treatment for putrescent canals, and the more extensive lesions possible, primarily from pulp-decomposition, have purposely been avoided, the writer aiming chiefly to point out, with the strongest emphasis at his command, the importance of removing dead tooth-pulps.

CORRESPONDENCE.

WORLD'S COLUMBIAN DENTAL CONGRESS.—CHANGE OF DATE OF MEETING.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—The following communication was received from President Bonney, of the World's Congress Auxiliary, which necessitates a change in the time of meeting, and also a rearrangement of the order of business for the World's Columbian Dental Congress :

"The Dental Congress has been assigned generally to the week commencing Monday, August 14, 1893. The congresses of Science and Philosophy have been assigned to the week commencing Monday, August 21, 1893. With more than a hundred congresses to provide for, you will readily understand the extraordinary difficulty of making suitable arrangements for each, but the extra provision which has been made for the places of meeting will render practicable arrangements which, under the ordinary circumstances, would be simply impossible. When the congresses were first proposed, we expected to have only one large audience-room, with a suitable number of smaller halls ; but as the World's Congress work enlarged, the places of meeting were also made more adequate. As the World's Congress Art Palace is now planned, there will be two large audience-rooms capable of accommodating three thousand persons each, and more than twenty smaller halls which will seat from three hundred to seven hundred persons each, thus providing for no less than thirty-six large meetings and three hundred and sixty smaller meetings in a single week, by holding morning, afternoon, and evening sessions. Among the other congresses assigned to be held in parallel with the Dental Congress are those of Pharmacy, Medical Jurisprudence, and Horticulture. For all these the accommodations will be adequate. You understand, of course, that everything in the nature of an exhibit is required by the Exposition authorities to go to Jackson Park. The congresses deal not with things, but with men ; not with matter, but with mind."

In accordance with the above statement, the time of meeting will be from Monday, August 14, to Saturday, August 19, inclusive.

Yours very truly, A. O. HUNT.

DEGENERACY OF THE JAWS OF THE HUMAN RACE.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—In looking over my figures I find three typographical errors, which have a tendency to injure the whole theory of the "Degeneracy of the Jaws of the Human Race" advanced by me. These errors should have been noticed when the proof was corrected, but owing to ill health I was unable to correct or even explain the figures as I should have done in the original article.

One is (near foot of page 348, DENTAL COSMOS, May, 1892) where the lateral measurement of the mouths of living persons is located, and where the word Chicago is used. 51 M. and 51 F. should be 61 F. These are the measurements made by Dr. Cressiman, and should

have been classed with the Swedes and Germans, as they were nearly all made up of that class.

Dr. Coleman's measurement of two hundred skulls in the Hythe Church, Kent, England, were left out altogether. They are as follows :

No.	Lowest.	Highest.	Average.
200.....	2.12 in. 53.76 mm.	2.62 in. 66.68 mm.	2.50 in. 63.50 mm.

At the bottom of page 344, of antero-posterior diameter, under "American Negroes," should have been placed my antero-posterior measurements of seven hundred and twelve male and female mouths of living individuals :

No.	Lowest.	Highest.	Average.
712.....	1.56 in. 39.69 mm.	2.19 in. 55.56 mm.	1.84 in. 46.74 mm.

It was necessary to group both male and female, because some of the measurements were taken from plaster casts, so that I was unable to determine the sex.

In comparing the width of the jaws of people whose ancestors have lived in this country for many years, it will be seen that there is not such a great difference in the width of the jaws. Thus, private female patients in Burlington, Vt., Boston, and Chicago show that there is only about .30 mm., while in male patients only about 1 mm.

By comparing these measurements with the ancient English, as made by Mr. Mummery and Mr. Coleman, we find a difference of about 12 mm., and the difference between ancient Romans about the same. The difference between the ancient English and the English of to-day is about 8 mm., and the ancient Romans and present Italians of southern Italy 10.50 mm.

The antero-posterior diameter of the present size of the jaws is about as low as the lowest of any of the measurements.

By comparing my measurements of New England stock with the ancient Britons as made by Mr. Mummery and Mr. Coleman, I find a difference from 7.79 to 12 mm. ; between ancient Romans and New England stock 10.97 mm. ; between the Anglo-Saxons and New England stock 9.38 mm. ; and between New England stock and present English 3.02 mm.

There would be a much greater difference shown in the width of the jaw of New England stock of to-day and that of the skulls of early races, if the measurements had been taken from the first or second bicuspid region, because the greatest contraction is anterior to the first permanent molar.

I have frequently made the statement that the teeth are the same size to-day that they were three thousand years ago. These measurements bear me out in that statement. While the lateral diameter of the jaws is considerably smaller, the antero-posterior diameter shows only a slight variation as compared with those of other tribes and nationalities. In order that the teeth may come into the arch uniformly, the anterior alveolar process is pushed forward. If the anterior alveolar process were as unresistable as the lateral alveolar process, more deformities would result.

I have shown, in the first part of my article, that the jaw proper

and the alveolar process are two distinct structures; that the bone proper was a natural development, while the alveolar process depended entirely upon the wedging of the teeth against each other for its size and shape. Now, these measurements do not accurately show the deviation of the jaw proper in either diameter of the people of the present day. The diameter of the jaw is frequently much smaller laterally and antero-posteriorly than the diameter of the teeth and alveolar process, which every observing dentist can substantiate.

The average height of vault of four thousand six hundred and fourteen measurements was .58 of an inch, while the average of two hundred and fifty-one skulls of ancient and modern Romans, Indians, etc., was .56; allowing for the thickness of the mucous membrane, the average height of the vault of the present people would be a little below that of the Indians, Negroes, ancient Britons, and Romans.

I have just received a work from England, entitled "The Neuroses of Development," by J. S. Clouston, M.D., F.R.C.P.E., Physician-Superintendent, Royal Edinburgh Asylum for the Insane; Lecturer on Mental Disease, Edinburgh University, from which I quote as follows: "The vaulted palate and altered dental arch must be taken with other changes in the head, and especially in the face expression, as one of the morphological indications that show a tendency in the person to whom it belongs and in his family toward developmental neurotic diseases, notably idiocy, congenital imbecility, stuntedness of growth, deformity, epilepsy, adolescent insanity, and that organic lawlessness and lack of mental inhibition or weakness of mind that distinguishes the criminal classes. It thereby is one of the marks of a family that is tending toward mental death and extinction."

He could also have added drunkards, geniuses, and extreme egotists.

EUGENE S. TALBOT, M.D., D.D.S.

PROCEEDINGS OF DENTAL SOCIETIES.

SECOND DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

At the regular monthly meeting of the Second District Dental Society, held in Brooklyn, December 12, 1892, a paper was read by Dr. W. J. Younger, of San Francisco, Cal., entitled "Some of the Latest Phases in Implantation and Other Operations," which is printed in full at page 102 of the current number. Following is a report of the discussion:

Dr. C. Heitzmann, New York. The fact that living fibrous connective tissue was found attached to the cementum is by no means a sufficient proof that this connective tissue was true pericementum. Newly formed cicatricial tissues would look under the microscope pretty much the same as the fibrous connective tissue of pericementum. The process of fixation of dead material in live tissues has often been studied; even leaden bullets were found solidly imbedded in the skull-bones or other organs and tissues. This fixation is invariably done by newly formed and vascularized cicatricial fibrous connective tissue. To conclude from this fact that the foreign body,

eventually the leaden bullet, has been endowed with properties of life by being implanted in living tissues of the organism, is not admissible.

All the implanted teeth—four in number—that I had the opportunity of examining after a period of two or three years, I have found in the process of absorption corresponding to the absorption of temporary teeth. By having become loose through the process of absorption, such teeth were rendered useless. To claim that an extracted and replanted tooth may become revitalized is against the laws of nature, and unfounded by microscopical research. A pulpless, devitalized tooth may remain solidly implanted in its socket for a number of years, and thus remain serviceable; but nobody will claim that a pulpless tooth will ever become revitalized. If Dr. Younger, owing to his special skill, is successful in keeping implanted teeth in their artificially made sockets for a number of years without absorption of the roots taking place, this is his special merit; it is more than others can do. But to claim that an extracted (therefore dead) tooth will become alive once more by being implanted into live tissues is wrong, and such a claim will never meet with the approval of microscopists, who know the difference in the structure of living and dead teeth.

Dr. R. R. Andrews, Cambridge, Mass. I have the highest respect for Dr. Younger's geniality, ability, courage, and skill. What he has made known of the truths of implantation has been of the greatest value to the dental profession and to general surgery. But when he makes the assertion in regard to the persistent vitality of the periosteum on teeth which may have been extracted for years, he makes an assertion which will be "denied, denounced, derided, scoffed at, and pooh-poohed" by every competent histologist, whether in "San Francisco, Boston, Paris, Berlin, or any other scientific center."

It is possible, with our knowledge of technique in the preparation of the specimens, to so prepare our tissue that the hard and soft parts may be seen *in situ*, without decalcifying. By a process elaborated by Dr. L. A. Weil, of Munich, the difficulties of the task have been overcome. His method is to take a piece of the human jaw, soak it in a saturated solution of corrosive sublimate and water, then in water to remove the sublimate, and then soak it in successive strengths of alcohol to absolute alcohol, and from that to chloroform, to which are added fragments of Canada balsam until we have a thick solution, and then drying in a warm place for several days until the balsam is hardened with the tissue. We can then cut sections of the entire mass, with a fine saw, under fluid, and the section so cut can be ground down until thin enough to examine. If we examine this, we shall find all the tissues in place, so that we may see the character of the tissue which runs through the spongy portion of the alveolus, and also the character of the periosteum which surrounds the tooth-root.

It will be observed in examining these sections that the tissue in the spongy portions of the bone merges into the periosteum, and is practically part and parcel of it. Now, when we wish to implant a tooth, we cut a new socket, with all the spongy places opening into this new socket filled with connective-tissue elements. When the tooth is implanted and made fast, these elements grow out and surround the root of the implanted tooth, filling up all space, and even into the microscopic inequalities of the surface of the cementum,

binding the tooth firmly in place. As we all know, John Hunter, over a hundred years ago, implanted a tooth into the comb of a cock, where it grew firmly and remained for some months. In his work he states that "the fang of the tooth to be implanted, when larger than the one it is intended to supply, must be made smaller." Could this be done, and save any of the old periosteal tissue? He continues to say, "The necessity of this should be avoided, if possible, for a tooth that is filed has lost all those inequalities which allow it to be held so much faster." In some cases this new tissue will calcify against the tooth-root, so that the tooth when tapped would seem to be grown to and to have become a part of the jaw; but there is never any actual uniting with the cementum. This tissue, when not calcified, is to be considered an outgrowth from that which occupies the spongy portions of the alveolus or jaw, as we may say it really becomes a modified periosteum. It is never a growth from any portion of whatever may have been left of the periosteal tissue on the implanted tooth. This is practically what I told Dr. Younger in Boston several years ago, and this is the kind of tissue which Dr. Younger found on the portion of the root grasped by the forceps; and right here is a point I wish to emphasize. "He immediately drops the root and crown into an equal portion of alcohol and water," and sends this to Dr. Jacobs. Dr. Jacobs examines it carefully, and says "the dentine and cementum were not blackened, to his surprise." And why? Dr. Younger used a tooth which was alive when it was first extracted, more than probably,—a bright, healthy looking tooth, as he is very careful to have such teeth for implantation. This tooth was put, surgically clean (sterilized), into a moist socket, where the connective tissue within the jaw grows about it. The tooth is kept moist, and the tubes of the dentine, perhaps once dry, have now become filled with moisture from the connective tissue which grows about its roots. When Dr. Younger extracted it from this moist tissue, where it had remained for some time in a fairly healthy condition, I would ask Dr. Jacobs if he would expect under these circumstances to find the dentine and cementum blackened? Not at all. The case is different when the tooth dies in its natural place in the jaw and becomes really dead; then we should expect blackened dentine and cementum. We see almost daily beautifully white teeth that have been long extracted. At the Peabody Museum, in Cambridge, we have hundreds of them in the jaws of the Sandwich Islanders, and loose in cases; beautifully formed and beautifully white, they are ideal, almost. These teeth, after proper care and in the right cases, might be implanted, and they would remain white for years where all conditions were just right, and in these cases you would not find blackened dentine and cementum either. As for Dr. Jacobs finding "pericementum firmly attached to a part of the tooth near the cervical portion, covering quite a large portion of the cementum," this adhesion is explained by the new tissue growing against and into the microscopic inequalities of the root-surface. I think Dr. Jacobs has made an unguarded statement when he says the hard as well as the soft tissues were still alive,—a statement only equaled by that of my good friend Bödecker when he told me that a pulp killed by cobalt would afterward come to life again. No, let me affirm again, there is no persistent vitality in any portion of any periosteal tissue on the root of any tooth dried and

which has been extracted for years. Dr. Younger must not take the great satisfaction that he assumes in this case. He has not yet made this "acceptable to honest scientists." I would say in regard to the assertions made by Dr. Jacobs, a gentleman I have not the pleasure of knowing,—and I say this in all courtesy to him,—a great deal of care should be taken before making such an assertion as he makes in the last sentence of his letter, which is given to the scientific world as a fact.

Dr. George S. Allan, New York. No thinking man having the slightest knowledge of the laws relating to life and matter could for a moment be misled by the statement made by Dr. Younger, or the indorsement, after microscopic examination, of his main position by Dr. Jacobs. The remarkable part of the paper is the willingness of the two gentlemen named to rush into print in an attempt to sustain a position that men well posted in the line of thought and inquiry suggested in it would not even notice. Certainly they would not unless accompanied by an overwhelming amount of evidence and an array of authority that left them no other course to pursue.

No biologist of the present time questions the law, *omne vivum ex ovo*, nor would he hesitate longer to give his support to the assertion that no dead matter, though once living matter, can again become living matter except through a process of digestion and assimilation through a living body. Such a thought as that Dr. Younger suggests—that a mass of dead matter can, as you might say, without breaking bulk or altering shape, become again living matter—would only excite laughter or derision in the mind of the true student of vital powers and conditions and their origin.

I wonder that Dr. Younger did not submit his paper to some one having correct knowledge of the fundamental biological laws he would overturn in his anxiety to sustain a false position,—a position, by the bye, not at all necessary to assume in order to support his well-merited claims in bringing to new life the possibilities of the system of implantation. I take it the Dr. Jacobs referred to by him is the same one who a few years since read a ridiculous paper condemning the theories of decay of teeth as set forth by Dr. Miller, of Berlin. In that paper he showed an amount of ignorance of the subject and of everything relating to it that was marvelous. Dr. Jacobs has prepared some passable microscopic ground preparations of teeth for the market, and many that were misleading; but I did not before know that he was an authority in biology who was worthy to sit side by side with Huxley, Tyndall, and Koch, and override their decisions and those of equal ability and power.

I see, therefore, nothing in the paper to discuss. Neither the statements of facts or principle, nor the authority referred to as supporting the deductions therefrom, are in any way satisfactory or of the slightest weight in enforcing the revolutionary theory suggested.

Dr. James Truman, Philadelphia, Pa. I hesitate to discuss this question, as I feel that this could only be properly done after a close examination of the tooth implanted and the tissue said to be adherent. Further, I have never had the opportunity to examine an implanted tooth under similar conditions, therefore it would be improper for me to undertake to criticise Dr. Jacobs's conclusions.

On general principles, I should say that Dr. Younger's conclusion

is premature, that "if the fact of renewed vitality has been discovered in one single instance, it is sufficient to establish the theory." It will require more exact investigation and corroborative evidence from other investigators before it can be accepted as a truth.

When it has been proved possible to endow a corpse with life, and send it out as a living verity, then I can accept this, and not before. It is impossible that life can exist in a tooth after its connections with the centers of vitality are severed; hence I hold, on general theoretical grounds, the re-formation of pericementum to be a myth. That a tissue is formed closely analogous and adherent, I regard as possible. The ivy clings to the dead stone, but gives no vitality to the stone; and the osteoblasts may adhere closely to the dead cementum, but cannot give life to the necrotic tissue.

It seems to me that the conditions described are precisely similar to those frequently met with in pyorrhea alveolaris. It is not unusual to find the tissues re-form around the dead root, very closely simulating the pericementum, and give rise to the query, Is it possible that a new membrane has been developed? I have never regarded this in any other light than a close adhesion after the manner described.

Dr. Edward C. Kirk, Philadelphia, Pa. The hypothesis of Dr. Younger respecting the persistence of vitality in the pericemental membrane in teeth which have been extracted from the mouth, as originally enunciated by him, is reaffirmed in the present paper as follows:

"It now affords me great satisfaction to announce that the theory of persistent vitality in tooth-structure, which I have promulgated in connection with the attachment that occurs in implantation, and which has been so denied, denounced, derided, scoffed at, and pooh-poohed in California, New York, Boston, London, Paris, Berlin, and other scientific centers, has at last been verified with a proof that must be accepted by all honest scientists."

The grounds for his renewed faith appear to be the macroscopic appearances of an extracted tooth which had been implanted by him, and which presented adhering portions of what appeared to him to be living pericementum, and the following statement by Dr. F. O. Jacobs, who made a microscopical examination of the tooth in question:

"The dentine and cementum were not blackened, to my surprise, as is always the case in a dead tooth. This indicates that the tissues (hard as well as soft) were still alive."

The point at issue is not, Did the tooth in question show living tissue which to all intents and purposes was pericementum? but, Was the adhering tissue the *original normal pericementum* of the tooth which, after having been dried, had persistently retained its vitality, or had its vitality reawakened after having lain dormant through an indefinite period of time, by being brought into relation with the vital tissue in the artificially made alveolus? This latter is the state of affairs which I understand Dr. Younger to claim to be not only possible, but distinctly proven by the conclusions of Dr. Jacobs, who says concerning the case from which the sections were made and which furnished the basis of his report,—

"Of course, if the fact of renewed vitality has been discovered in one single instance, it is sufficient to establish the theory, for the failure

to prove this in other investigations only shows that the conditions were not proper, and therefore not to be considered as relevant."

The hypothesis that the pericemental membrane is endowed with persistence of vitality to the degree claimed for it by Dr. Younger I have always regarded as absurd upon its face, and, so far as I am aware, no evidence worthy of the name has ever been adduced to show that the pericemental membrane possesses greater vital tenacity than any of the other tissues of the organism. General clinical experience would seem to show that it was somewhat relatively deficient in this respect. If persistence of vitality in the pericemental membrane is the cause of success in implantation operations, or if its success is dependent upon such a cause, how are we to account for the successful results from this operation in cases when a scion tooth is used which has been completely denuded of its pericementum, as I have frequently done myself, and so have many others? It is a matter of surprise to me, and I am almost tempted to say regret also, that in the face of such carefully recorded results as were reported by Drs. Heitzmann and Bodecker at the nineteenth anniversary meeting of the First District Dental Society of New York, and similarly those of Dr. W. M. Gray reported by Dr. G. Lenox Curtis at the same meeting, all of which was published in the DENTAL COSMOS for May, 1888, both Dr. Younger and Dr. Jacobs have failed to see that the vital connective tissue which they have found adhering to the root was not the original normal pericemental membrane, but a new connective tissue resulting from the exudation of plasma cells proliferated during, and as a necessary part of, the reparative process following this operation.

I do not mean to assert that it is possible for the histologist to distinguish between this new-formed tissue and the original pericemental membrane, for of this I do not know, as I am not a microscopist; but what I wish to emphasize is that this new connective tissue, which constitutes the bond of union between tooth and socket during one stage of the process of repair in implantation cases, is formed in cases where the scion tooth has been stripped of its normal pericementum, as well as in those where it has been allowed to remain. I have said that this newly formed connective tissue constituted the bond of union in successful cases *during one stage* of the process of repair, for I believe that as the process of organization continues, this new tissue becomes infiltrated with lime-salts until a bony encapsulation or encystment results.

This is the view which I have definitely held since hearing the reports made before the First District Society in 1888, as noted, and is included in my paper on implantation read before the Pennsylvania State Dental Society, June 6, 1888, and published in the *Independent Practitioner* for September of that year, from which I quote the following:

"When we consider the process by which a wound of the tissues involved in the operation of implantation is repaired under normal conditions, and in which we do not have to deal with the tooth as a factor, the *rationale* of the method is easily understood. Immediately following the incision, an exudation of leucocytes or so-called plasma cells takes place; these become organized and develop into connective tissue with its capillary blood-vessel system, following

which, in bone, a deposit of calcific material takes place, and ossification ensues through the agency of the osteoblastic cells which belong to the connective-tissue group.

"Under unfavorable conditions,—that is, where from any cause the irritation is sufficiently great to set up and maintain for a time a high state of inflammation,—giant cells or osteoclasts are developed, and absorption takes place through their agency until [the root] the cause of the irritation is completely removed. It is possible for the inflammatory process to abate, and a normal condition of the tissues result, whereby the reparative process first alluded to will follow, even after a considerable degree of absorption has taken place."

This is also the view held by Professor Sudduth, from whom I quote the following in the Transactions of the American Dental Association for 1888, page 205 :

"The method of attachment of implanted teeth can be understood by studying histologically the repair of tissues in general. In implantation a wound is made in healthy tissue ; by way of repair, lymph is thrown out, which becomes organized into connective tissue. The original attachment of the tooth is fibrous in character, but in implantation freshly wounded bone-tissue surrounds the root, and its tendency is to develop new bone ; and if the inflammatory condition be kept at a minimum, the tooth simply acts as a stimulant, inducing the development of bone, the particular tissue needed for repair in this case. The tooth then becomes fastened in its place, not by vital union, unless the tooth had been taken from one mouth and immediately inserted in another, but by a process of ankylosis."

The results of the microscopical investigations of an implanted tooth made by Drs. Heitzmann and Bödecker and by Dr. W. M. Gray, before referred to, must stand until it can be shown that they were faulty or erroneous. From the report, which bears all the evidence of a careful and conscientiously worked-out research, I quote the following statements :

"There was no trace of the original pericementum, but in some places the writers noticed delicate and finely granular bundles of connective tissue, obviously newly formed from the protoplasm around the cementum, which entered even the crevices on the surface of the cementum." And further : "The writers emphatically deny that in this implanted tooth a living union had taken place between the granulation-tissue of the jaw on one side and the cement and dentine of the implanted tooth on the other side. We also state that a re-vivification of the once dead tissues of the implanted tooth had not occurred, since the writers observed nothing in the above-mentioned specimens to grant such an assumption."

The deduction which Dr. Younger makes from the statement of Dr. Jacobs, respecting the vital character of the tissue which forms the bond of union between the socket and the implanted tooth, is altogether unwarranted by the fact which he cites. The utmost that can be allowed from the examination and test in the case of Dr. Younger is that the extracted tooth presented adhering portions of vital tissue. This is freely admitted, and will be denied by no one who has studied the clinical phases of the operation of implantation. With reference to the color reaction upon which Dr. Jacobs has based his differentiation between dead and living tissue, I am not at all con-

vinced of its conclusiveness, but this is a matter which those who are familiar with it are more competent to decide; and after all it is of little consequence, for the reason that the existence of vital repair-tissue has already been demonstrated by the histologists first quoted, who reported upon the nature of the bond of union in implanted teeth at the anniversary meeting of the First District Dental Society in 1888.

The hypothesis of persistence of vitality in the pericemental membrane I still consider untenable in the light of the facts before given, and the case reported by Dr. Younger I regard as not even in evidence, much less a proof of his point. He has simply shown what was already known, that the vital repair-tissue closely adheres to the implanted root even after extraction.

If he would prove his hypothesis to be correct, he should demonstrate that the vital tissue found in these cases is not newly-formed repair-tissue, but the original normal pericemental membrane, and also explain why a root devoid of its pericementum can be successfully implanted, as I am sure he knows that it can.

Dr. W. X. Sudduth, Minneapolis, Minn. In regard to the conclusions drawn by Dr. Younger, it seems to me that they are hardly permissible upon the evidence presented. Let us see what that evidence is. The tooth was implanted and became attached in a way that was fairly satisfactory to the doctor and his patient, who by the testimony seems to have been a very exemplary one. Most patients would hardly have been so tolerant of such results. The fact that the root broke in extracting the tooth indicates two things: First, that osseous union had taken place over a portion of the root, probably that portion spoken of by Dr. Jacobs as being covered by pericementum. Second, that absorption had taken place near the end of the root which broke off in the extraction.

Now, I do not see anything new in either of these conditions. I have examined any number of teeth that have presented the same appearances, and never for an instant have I considered them evidences of "persistent vitality."

As I have before indicated,* the method of attachment in implanted teeth is, first, a fibrous encapsulation by ordinary connective tissue. In some instances the fine fibrils, as I have demonstrated in times past, may enter the lacunæ of the cement, and thereby become firmly adherent to the root, so much so as to bring away a considerable portion of connective tissue with it when it is removed; but this does not indicate "persistent vitality" in the old pericementum. The same conditions would be present in the case of implanting any porous non-irritating body in the jaw. It is nature's way of taking care of all foreign bodies, provided they are in an aseptic condition at the time they are implanted and remain so.

And this brings us to the consideration of the only new feature introduced into the discussion of this question, and that is Dr. Jacobs's statement that "the dentine and cementum were not blackened, . . . as is always the case in a dead tooth." "This indicates that the tissues (hard as well as soft) were still alive."

To discuss this point intelligently, it is necessary to inquire into

* See American System of Dentistry, vol. ii, pp. 377-8.

the conditions that give rise to blackening of the dentine and cement in a tooth the pulp of which has been devitalized, for this is what I presume Dr. Jacobs means by a "dead tooth." The only conditions that I am conversant with where "blackening" occurs in devitalized teeth are two: First, where, as the result of intense congestion, the imprisoned red blood-corpuscles disintegrate, and hæmatin becomes diffused throughout the substance of the dentine; but as the pulp of this tooth had been removed, and the canal filled before it was implanted, it does not come under this head. The second is where, as a result of abscess, the root is imbedded for a considerable time in decomposing pus. From the history of this case, no such condition existed, consequently there was no reason why the root should be "blackened." If such a condition had existed, the tooth would never have become attached, as the history indicates it did.

Finally, in the note at the foot of the page on which Dr. Jacobs's letter appears, he says, "Of course, if the fact of *renewed* vitality has been discovered," etc. If the vitality had to be "renewed," it could not have been "persistent." Things that need "renewing" have generally come to an end, and if that object is "vitality," then its end is "death." So, according to Dr. Younger's own reasoning, the pericementum that originally covered that tooth, which has such a complicated history that it is hard to tell whose pericementum it really was, was at the time it was implanted in the San Francisco physician's mouth "as dead as a door nail." Now, I have talked considerably with Dr. Younger on this subject, and I do not believe that he really thinks that there is such a condition as "persistent vitality"; but you know the old story about "a good man gone wrong," etc. Now, let us come to an understanding regarding the condition of the discussion. The facts are that the pericementum is only a connecting membrane between the root of the tooth and the inner wall of the alveolus. It is composed of fibrous connective tissue, the analogue of which may be found anywhere in the body. If a portion of pericementum were to be detached and placed under the microscope, there is not a microscopist living who could distinguish it from membranous tissue from other portions of the body. There is nothing specially characteristic of the pericementum that would enable the observer to diagnose it as pericementum. That being the case, why should Dr. Younger contend for its "persistent vitality"? It can be developed at any time, and under favorable conditions, in any portion of the body. Let us say that the "pericementum" is renewed in successful cases of implantation, rather than that the "vitality" is renewed. "Mummy teeth" have no scientific value, even if the pericementum is "vitality persistent." Fresher teeth are more presentable, and surely will be more acceptable to patients.

Dr. J. P. Geran, New York. To say that a large majority of replanted, transplanted, and implanted teeth may be rendered healthy and useful for an indefinite period is a fallacy, although if the health or constitution of the patient is favorable, and it is one of the superior or inferior anterior teeth to be restored, it is well worth a trial. But great care should be used in selecting the proper kind of cases upon which to operate. Lack of discrimination in this regard is, or has been, the cause of many failures.

Again, to say that a bony union takes place between the root and

the alveolus, or that there is a revivification of the pericementum, it strikes me is also a fallacy. Some one, in writing on this subject (I cannot now recall who it was), said that this union took place by ankylosis.

To refute that idea, let us define and thoroughly understand what ankylosis is.

Ankylosis is a union, either osseous or membranous, between bones, the ends of which are in apposition to each other, and the opposing surfaces of which have been deprived of their cartilages; both bones being alive or nourished, the same as before such union has taken place.

Now, in the case of a transplanted tooth the circumstances are entirely different. We have, first, the jaw-bone with its alveolus covered by periosteum. In opposition to this, we insert a dense tooth deprived of its vital connective membrane. To put this foreign body (for such it must be), a dead tooth that has been extracted, it may be, for many years, into apposition to live tissue, and to get by so doing union such as is found between the bone and tooth, is, in my opinion, an impossibility. In other words, you cannot restore to its functional duties tissue that has been deprived of its vitality perhaps for years. Neither can you cause the periosteum covering the surface of the alveolus to attach itself to a *dead* replanted tooth. I say dead, because I am satisfied that when we extract it the connective tissue is torn asunder, and the manipulations which it has to undergo in our hands complete its devitalization.

Why a transplanted tooth remains in the alveolus and becomes firmly fixed in its position has been and is yet a debatable subject, notwithstanding Dr. Younger's positiveness. On this I will only add one thought.

Irritation in the preparation of the alveolar socket causes to be thrown out, and surrounding the root of the tooth, osseous tissue, which, acting like a cement, as it were, fills up all the irregularities upon and around the roots of the implanted tooth, thus holding it in position in the alveolus. That there is ever a union, or can be such, or the revival of the vitality of the pericementum, I deny.

No tooth that has been replanted ever took root in the world.

JOINT MEETING OF THE FIRST AND SECOND DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

A JOINT MEETING of the First and Second District Dental Societies of the State of New York was held Tuesday evening, December 13, 1892, at the New York Academy of Medicine, No. 17 West Forty-third street, New York city, Drs. William Carr and O. E. Hill presiding.

Dr. C. F. W. Bödecker, chairman of the Clinic Committee, read the following

CLINIC REPORT.

At the clinic to-day I am sorry to say there were no patients present, as they all disappointed the operators, owing probably to the disagreeable weather. The attendance was over forty. Instead of the patients, however, we had an exhibit of a great many very valu-

able things. Dr. Van Woert, of Brooklyn, presented a case in which he had engrafted the six upper incisor crowns, which were made of ordinary plate teeth and engrafted with metal pins, and then set with cement. They had been in position over four years, and appeared beautiful in every respect. He also showed how to strike up a grinding-surface for a gold crown upon a piece of wood, which seems to be superior to the use of lead. He also exhibited a blow-pipe of his own construction, made of brass tubing in the usual way, but instead of using the mouth, he had attached to it an ordinary rubber bellows from a spray apparatus, which worked very nicely indeed. . . . Dr. Freeman intended to demonstrate an operation of removing the pulp and treating by the Herbst method, but the patient did not come. He exhibited a Herbst matrix, and also a Herbst instrument for measuring the bands around roots for crowns. It is a very neat contrivance. There are, I believe, twelve or eighteen different sizes of rings, strung upon a little chain. In fitting a cap to a tooth, the rings are tried over the tooth until you obtain the proper fit. On each ring there is a number, and with the rings an accompanying gauge, and you can cut your length of banding material according to the gauge, and get it exactly right when it is soldered. . . . Dr. Gaylord, of New Haven, exhibited a new Morgan and Mansfield disk-carrier, and Dr. St. G. Elliott, of Goshen, exhibited a medicine-case which has some advantages. He puts the medicines in glass test-tubes, in the corks of which are fitted a small glass tube which will only admit of one drop being poured out at a time, thus avoiding the taking out of the corks from the ordinary bottles. He also exhibited a new file-carrier, and a disk-carrier. . . . Dr. Peck, of Morristown, N. J., exhibited a new tape-holder, although I think this was shown once before. . . . McKesson & Robbins exhibited their pyrozone, which comes in three degrees of strength. The weakest one, which is the three per cent. solution, is meant to be used as a mouth-wash, and also in cases where weak solutions are required. The five per cent. is an antiseptic solution, and is to be used to remove green-stains from the gingival borders of the necks of teeth, as well as for bleaching, etc. The next is the caustic pyrozone. It is used as a caustic, and also, with special care, it can be used as a bleaching agent. I have made some experiments with this preparation, and in a little while I shall be able to report more fully. I am able to say now that an application of caustic pyrozone upon the enamel of the teeth does not immediately do any harm, but if left there thirty-six hours it swells the protoplasm considerably. I should be very careful not to get it near an exposed pulp, because it swells it to such an extent that I think it would produce considerable pain. . . . Dr. Timme, of the Timme Manufacturing Co., exhibited a new cautery apparatus which was reconstructed from the old Parkins method, in which the knives were very large and clumsy; but these have been remodeled, and the difficulty of the clumsiness which they formerly had is overcome to a great extent. He also exhibited a new form of magnifier to be used in the mouth, and a new English pink rubber to be used for facing sets; it has a beautiful color. Also a new method of drying pulp-canals by means of potassium and tin mixed together. It is introduced with a fine platinum wire, and immediately upon coming in contact with moisture the potassium will

explode and produce a great deal of heat. Dr. Timme has tried it in a number of cases, and he says it is not painful, and is very effective. . . . Dr. J. G. Morey had his nerve-drills on exhibition.

INCIDENTS OF OFFICE PRACTICE.

Dr. S. Freeman. I wish to relate a case of iodoform poisoning. A young lady about nineteen years of age had her teeth filled with a mixture of iodoform and oxyphosphate. The cement fillings had been breaking away for the last three months. It produced a nauseous feeling and an eruption on the face. I removed these fillings about a week ago, and the patient seems to have recovered. I present this case to caution against mixing iodoform with cement, and allowing such filling to be exposed to the fluids of the mouth. I cannot make a complete report, as the case has been in my hands only a few days; but she is improving, and entirely free from the nauseous feeling.

Dr. Bödecker. I wish to report to you a very extensive case of necrosis that I treated in the beginning of this year, which in some respects is of considerable interest. The patient was a lady about forty years of age. The necrosis was on the left upper jaw, extending from the eye-tooth to the wisdom-tooth, and involving the entire maxillary border and the floor of the antrum. I treated the case about two or three weeks, and removed considerable bone, and at once the patient complained of great itching in her face and nose, which a couple of days later was followed by an extensive eruption on her face. Her physician came to me and said she was in great pain, and consulted me as to what I had been using to spray the antrum. At that time I used listerine and water, half and half; so I concluded that if that had anything to do with it, I would use some other remedy. I first tried three per cent. of boracic acid, aqueous solution, and that did not stop it; so I used a very weak solution of carbolic acid, but that did no good. Very soon the face showed an eczema on the whole of the left side, from the nose upward to the eye and back to the ear. I then applied a mixture of cold cream with aristol, and very finely powdered boracic acid, previous to spraying. This application produced great relief, but the mucous membrane of the nose was still in a very inflamed condition. To overcome that I took one of the Elsberg's forceps, such as I have here, put a piece of cotton in it, saturated it with cold cream and aristol and boracic acid, and in this way I made an application with this substance to the middle and inferior meatus of the nose, reaching a little farther back than the opening of the antrum; but that was not sufficient either, and I had to study out how I could prevent the spraying liquid from touching the face or the nose. I therefore devised a glass tube with a piece of rubber around it, with the point of the spray apparatus going inside of the tube, and then attached it to the spray. This rubber portion exactly covers the orifice of the necrotic cavity. As the spray liquid escaped from the antrum, it was caught by the rubber and flowed into the glass tube. Not a drop of the liquid which came out of the antrum touched either the mouth or the nose of the patient. In this way the eczema was cured in a very few days, and no recurrence took place as long as I used this, except once, when my spray apparatus accidentally broke, and I was compelled to

use an ordinary syringe to rinse out the cavity ; the next day the patient came back with intense pain and an eruption on her face, which again disappeared when I used the other apparatus.

Dr. Carr here invited Dr. Hill, the president of the Second District Society, to preside over the meeting.

Dr. Hill. It has for many years been our desire to have a joint meeting of the dentists of New York and Brooklyn, and as most of us are acquainted with each other, we concluded not to have it formal in character, but to meet as if we were having a joint meeting. When the Second District Society adjourned last night, it was to meet here this evening, and the meeting becomes from now on a union meeting. We want to be just as much at home here as in our own offices. As to those gentlemen who do not reside in either the First or Second Districts, I will say that we are sorry that they do not live within our precincts, but we invite them to participate in our discussions.

Dr. Hill introduced Dr. Frank French, of Rochester, who read a paper on "Orthodontia," which is printed in full on page 116, current number.

Discussion.

Dr. J. N. Farrar, New York. I have been greatly interested in this essay. The question to decide in a given case is, Which is the best plan, and if springs are to be used, how should the device be constructed? In other words, make it right in the first place. The speaker said that he did not get his first one right, but succeeded later. I suppose that the object of this remark was to suggest the importance of starting right. The main question of the present day is not so much to prove that teeth can be moved. We all know that they can, and that perfection can be obtained in almost all cases by proper skill. I think we all know, also, that many dentists think that they have this proper skill, when in reality they do not have it. They can move teeth, but they do not place them properly, because they lack in esthetics. There is such a thing as evening a set of teeth and yet not correcting the facial deformity. Some of the worst deformities that we find are in cases where the teeth are already even. I had a case in consultation this morning in which both arches were beautiful when seen separately ; but as the upper arch projected forward of the lower arch five-eighths of an inch, the face was hideous. There are also cases of irregularity of the line of the dental arch which, if made even without extracting any of the teeth, would cause just such a result as this protruding case. I have seen cases that have been claimed by the operator as corrected, when they had only accomplished that end. Some dentists cannot understand why in any case a tooth should ever be extracted. Such dentists cannot make a uniform success in this branch. It is not so important to have a full quota of teeth as it is to have proper antagonism of the teeth. To come to facts, there are esthetic results, and there is such a thing as an unesthetic result. One is from the hands of exceedingly high art, and the other is evidence of no art at all,—simply mechanical manipulation.

In our profession, as in all other esthetic professions, such as

painting and sculpture, there are but few real artists—esthetic artists. How few men ever lived who have painted a picture or chiseled a statue that has been admired for hundreds of years! We can count them on our fingers and thumbs. Of course in this I refer to master artists. In our profession we do not find so small a percentage of high esthetic taste and skill, but we do find great difference in dentists. In the makers of artificial dentures we find those who can arrange the teeth so that they will improve the facial expression and beautifully balance the contour of the face; so do we find those who can arrange teeth seemingly just as well as they, but when put into the mouth everybody knows that they are artificial. In either case, people want to know who made them, so that they can go to the one and steer clear of the other. It is so in the art of filling teeth. Some can excavate and trim a cavity so as to leave beautiful curved margins, making the form of the filling interesting to look upon; while others cut the margins angular, thus causing unsightly fillings. One is artistic work, the other is not. Maynard excelled in the former.

In operations for the correction of irregularities of the teeth there is found in dentists the same difference in taste. I have seen representations of cases in plaster, brought before societies and held up as examples of perfection, that were far from perfect. I remember one, where formerly the upper arch was very irregular: the teeth had been evened, leaving them so that they did not antagonize properly with the lower; in fact, some of the upper side teeth were pushed entirely outside of and beyond the lower arch. Had one or two side teeth been extracted, and the arch shortened by moving the teeth anterior to them back, the operation would have proved to be perfect. I have seen cases brought before this society where the upper cuspids had been moved so far outward to make space for arranging jumbled incisors in line, that when the patients smiled there must have been flatness of expression, with a deformity of face as great as before. In these cases, had a second bicuspid on each side been extracted, and the cuspids been moved back, the results would have been of the highest possibilities. I saw a similar case here in which the operator failing to even the front teeth after the cuspids had been moved too far outward, had subsequently extracted the first bicuspid, thus leaving a wide, conspicuous space behind each cuspid,—two deformities instead of one.

The face should be studied well before undertaking to move any teeth. Of course, it is not expected that all people have the gift of seeing far ahead, and at a glance see all the necessary steps to a perfect ending, but all can get good advice if they ask for it.

In regard to the notions entertained by dentists about different plans and devices, it is the same in our profession as with farmers. One person is satisfied with old ways and old tools, and another prefers new ways and improved tools. It seems to me that the devices for the correction of irregularities of teeth should show the highest skill possible. Not necessarily the highest finish as to luster, because during the operation the little alterations that are necessary will injure fancy luster. The device should be made so as to do its work thoroughly, and not accumulate and retain *débris* among the teeth. I emphasize the latter, because some patients are very untidy in their oral habits. I have had some cases of irregularities that I have

corrected, needing retaining devices to hold them in place. I have used roof-plates, and although explicit instructions were given that they should be cleansed after each meal, they would not clean them. I have had patients who, going to the country in summer, would return in the autumn with the plate looking as if it had never been removed from the mouth, and the lingual sides of the necks of the teeth showed injury. Although it was not my fault, it was mortifying to see such results. Now *I seldom use plates in any form*, for this reason. There is no word sufficiently strong to express the filthiness of the mouth of many of the human race. Sometimes our best efforts in the correction of irregularities for such people are censured by other dentists who do not know the circumstances, do not know that the fault belonged to the patient. Now and then there is a family who keep their teeth and their mouths tidy. A list of such patients is a joy to a dentist.

Sometimes a dentist will correct cases, and then the patient takes a trip to Europe, and when he returns the dentist finds that the teeth have become as irregular as ever. Parents then say, "Well! I won't have my daughter's teeth straightened; look at young Brown's teeth; he went through it, and spent hundreds of dollars for it; now his teeth are as crooked as ever." The dentist should always give such patients duplicate devices. Having put one in the mouth upon leaving the pier, say, "Never take it out while on the ocean, because you may not be able to properly replace it. When you get on the other side of the ocean, do as you like. You must, however, clean it the best you can every day with a brush." Sea-sickness is a matter that we should guard against, and it is only the duplicate device that can insure safety for our results. If the first device is lost overboard, the other comes to the rescue. To correct teeth properly the second time is more difficult than the first. This is because of less firmness of the anchor teeth. I would not have it thought from this remark, however, that teeth cannot be corrected the second time. They can, but it generally requires greater skill than before.

Dr. Wm. Jarvie, of Brooklyn. The subject of the treatment of irregularities is one of the most important that comes before us, and the importance of it is best proven by the mention of the fact that some of the ablest men in our profession have given their undivided attention to the subject.

The types of irregularities are so many, as regards the arrangement of the teeth in the maxillæ, the occlusion of the teeth, and the relative position of the jaws, and the effect that these abnormal conditions have upon the contour and the profile of the face, all of which must be taken into consideration in deciding upon the best mode of treatment. In some cases, it would be improper to attempt to regulate without extraction, and in other cases it would be just the opposite. But it is almost impossible to describe without models the proper treatment in certain cases.

In some cases, the best thing would be to use what Dr. Farrar calls the positive method; in others, the crib method used by Dr. Jackson; and yet in others, the method used by Dr. Talbot, of Chicago. Knowing that this subject was to be presented, I have brought with me some models which I thought might prove interesting. They illustrate the great difficulty experienced in moving teeth that on

first glance seem very easy to move. The models are those of a boy fourteen years of age. The first models have been lost, and consequently these models that I have as the first were taken at the secondary stage in the process. I met with just such a difficulty as Dr. French did in moving the lower cuspid. I attempted to move the right lower cuspid, using as a stay the first molar and the second bicuspid, the first bicuspid being extracted, and I found the molar and bicuspid inclined to move rather than the cuspid. I used ligatures of various kinds without any avail, and it was only when I swaged platinum caps, going over the second bicuspid and the first and second molars, and cemented those on and attached a screw from those to the cuspid, that the cuspid consented to move. This apparatus worked beautifully, and the proper teeth moved as rapidly as we wished in the direction desired. Sometimes that is the only method that I have found to move some teeth,—the teeth in the lower jaw of this boy particularly. He had the worst-looking, the most irregular teeth I ever saw, and yet the irregularity was not as difficult to overcome as some others that do not look as bad at the first glance. The cuspids were so prominent that they bulged out his lip, but the lad was a good patient and very persevering, and the final result was very satisfactory. I intended to have the appliance here by which these teeth were moved, but I see that I have not brought it with me.

Dr. V. H. Jackson, of New York. I am interested in the method of retaining plates described by the essayist. I know of no method that is so perfect for retaining plates as he has shown to you. There are cases where this method of retaining could be improved upon by extending one or more springs from the plate over and around one or more teeth on either side of the arch. It is expedient in some cases to open the bite in order to throw the teeth over, although I have had but one case in three or four years where I thought it necessary. If my spring appliance should be used for the purpose, metal should extend from the crib over the teeth. It is more cleanly than the rubber, and the appliance will be retained more firmly to the teeth. The clasp and crib is the most perfect method of retaining adjustable appliances. I remember I recommended them in a paper before the Odontological Society.*

Dr. French's paper rather favors the extraction of an incisor in place of a bicuspid. I have not as yet extracted an incisor to assist in regulating the arch. I prefer to keep the space as broad as nature has intended it between the cuspids, both in the superior and inferior arches. I think if Dr. French had presented the models and apparatus used in this special case, they would assist in giving a more definite idea of the difficulties he had to encounter. I have adopted the method of presenting the apparatus with models, and believe it should be encouraged.

The doctor has used apparatus which takes up much time and study to construct. I could hardly see the necessity for so many pieces. In the system I use I can accomplish the work in many cases without making the appliance over again, by attaching additional springs. For retaining, I recommend, as Dr. French has done, the

* See DENTAL COSMOS, vol. xxix, page 373.

round wire. I think it is much better than the flat wire, as there is less contact with the teeth, and also if there is any change in their position, the round wire will still fit them, where if it were even half-round wire, it could not be made to fit after the tooth had moved.

In regard to methods of retaining the teeth after regulating, I have utilized the crib system, which can be easily removed by the patient and cleansed and replaced as often as necessary, or as the dentist directs. The crib can be made to fit so perfectly that there is not much trouble from accumulations underneath.

I hear that there was a statement made at the New York State meeting—not in session, but in a little circle of dentists—that the system Dr. Jackson is practicing is killing more pulps than any system that they knew of. I would state here, publicly, that I know of no case where I have killed the pulp of any tooth since I commenced the system of regulating with the crib. I have a record of but one case, and that occurred eight or nine years ago, with another method.

Dr. Hill. I have the pleasure of introducing to you Dr. L. D. Shepard, of Boston, who will now address you about the World's Columbian Dental Congress.*

Adjourned.

B. C. NASH, *Secretary*.

AMERICAN DENTAL ASSOCIATION.

(Concluded from page 67.)

THIRD DAY—*Evening Session.*

THE association was called to order at 8 o'clock P.M., President Walker in the chair.

Section VI, Physiology and Etiology, was called, and Dr. H. A. Smith, chairman, read the report. An abstract follows:

The report called attention to the examination of pre-historic crania under the direction of the Section, and in which satisfactory progress has been made, as will be shown by the report of the curator, Dr. John J. R. Patrick. As the work has progressed, the members of the Section have become more and more convinced of its scientific value, and that in ordering these investigations the association has evinced the true scientific spirit. The Section has one paper to present, by Dr. J. D. Patterson. The report concluded with a statement of the expenditure of funds in pursuing the investigations before referred to.

Dr. J. D. Patterson, Kansas City, read his paper, which was entitled "The Effect upon the Tissues of the Oral Cavity Produced by the Internal Administration of Certain Drugs." †

Dr. W. W. Coon, Buffalo, questioned the statement that the blue line is always caused by deposits of tartar around the necks of teeth. Just before leaving home he took an impression of a lower jaw in which there were several bluish deposits, and he remembered cases where the necks of the teeth were entirely free from deposits; yet upon holding the gum away from the roots the blue line would show.

* Printed in full on page 85 of the current number.

† Printed in full in the DENTAL COSMOS for November, 1892, page 904.

These were certainly pigmentary deposits, and not the more common pseudo-colorations from underlying tartar.

Dr. Fillebrown was quite in sympathy with the views advanced by Dr. Patterson. There seldom was real salivation. Many cases of so-called blue line, if closely examined into, prove to be caused by irritating substances deposited under the edge of the gum. Lead may sometimes cause blue line, but not always. He had a patient twenty years ago, a lady who was apparently in perfect health, but who had the blue line around each tooth. The teeth and gums are still healthy, and there is no calculus. This blue line may have a variety of causes, and it is not pathognomonic of any one disease. In reply to a question, Dr. Fillebrown stated that so far as he knew the patient he had spoken of had never used charcoal as a dentifrice.

Dr. Edward C. Kirk, Philadelphia, had never seen a case of mercurial salivation, and he would not dwell on that because he believed it to be very rare in these days. He rose to report a case in which there was a very distinct blue line upon every tooth in the mouth, though it was more marked anteriorly than upon the posterior surfaces. It was a case of pigmentation from the use of charcoal as a dentifrice. You could lift the gum away from the necks of the teeth, and in some places see particles of the charcoal. The patient, who had very fine teeth, had used charcoal all her life.

Dr. H. A. Smith. Reference has been made to the blue line which we occasionally see about the teeth in which there is no disease. This particular blue line is often seen in the African. In the few mouths of negroes which he had examined, he had found this blue line frequently, and he had also one patient who had it, suggesting the query if she were pure Anglo-Saxon. He would like to ask Dr. Morgan if it was characteristic of the African race?

Dr. Morgan. It is one of the characteristics of the pure African, and often obtains among the mixed races, among whom there is a legend to the effect that the bite of a negro with blue gums is death. Sometimes the entire gum-tissue is pigmented and dark, but at other times it is distributed in irregular splotches near the teeth.

Dr. G. E. Hunt. The thought occurs that possibly this blue line may be due usually to congestion at the point where it is found. If that is correct, it will be present whenever there is a low grade of irritation there. He thought it likely that this is true, and that when it appeared after the administration of mercury, it may be due to the greater deposit of salivary calculus from the greater quantity of saliva brought out when taking medicines of this character.

Dr. Carl T. Gramm, Keokuk, Iowa, had a young lady under his care with excellent teeth and of excellent parentage, who had this blue line upon the gum for years, and he wanted to take exception to the statement in the paper that this condition was always due to neglect of the teeth or mouth under the circumstances referred to. We have similar ulceration of the gum-tissue where no specific taint is presented, and mercury is quite frequently administered in troubles not at all specific. The degeneration of the gum-tissue and alveolar process by mercurialism is not at all parallel to the destruction of tooth-tissue during pregnancy, since the causes underlying the two conditions are entirely different.

Dr. W. P. Horton, Cleveland, Ohio, was satisfied that in a large

proportion of cases the appearance of the blue line on the gum can be traced to calculous deposits.

Dr. J. E. Cravens, Indianapolis, thought that this discoloration was sometimes caused by patients using soap to wash their teeth without any powder. In many such cases the teeth will become coated.

Dr. Barrett had seen the blue line around the gums at times when it was simply a surface deposit, and so easily removed. It was not, strictly speaking, something that we could wash off, but it could be rubbed off with comparative ease. He could not conceive that mercurialism would cause the blue line around the gum. He had seen it cause a purple gum. He had not seen many cases, but enough to lead to the conviction that mercurialism does produce a decided disturbance in the oral tissues. The peculiar fetor and the metallic taste are certain concomitants of ptyalism, but the tint is usually purple instead of blue, not unlike that which is observed in some necrosed conditions of the bone.

Dr. Patterson thought that Dr. Gramm misapprehended the statement of the paper in regard to the condition known as salivation being the same as that which is found during pregnancy. The paper merely compared the two conditions, and said that the mouth needed more care and received less under both conditions. He did not deny that there may be ulceration from hydrargyrisms; there may be a low grade of irritation on account of the impoverished condition of the blood. The gums are pale, they are not blue, and he does not see them purple. His claim is that the blue line and the inflammation found in connection with so-called excessive salivation are in a large degree the result of local irritation. Ptyalism, or mercurial poisoning, is not like this. Salivation is merely a condition of enormous secretion of all the fluids of the body due to impoverished blood, but these symptoms of salivation as described by medical men are not symptomatic of hydrargyrisms. He has proved this many times, having been fortunate in having a large number of cases referred to him by a specialist for the express purpose of testing this matter.

Dr. Morgan was reared in a country where mercurials were given freely; and while he has not seen many cases of ptyalism since becoming a professional man, he has occasionally met with them in all stages. Not long since he was called to see a patient, and found a portion of the superior maxillary necrosed, the result of ptyalism. There was considerable ulceration on the palatal surface of the second superior molar, and a portion of the bone was loose. When this came away it brought with it the crown of one of the permanent teeth.

Dr. Patterson replied that he had not been discussing the result of the obsolete practice of giving enormous doses of mercury, but he would like to ask Dr. Morgan how he distinguished whether the necrosis he had spoken of was caused by the mercury or by the disease for which the mercury was given?

Dr. Morgan replied that he had learned it from the physician who treated it.

Dr. Patterson wanted to know how the physician distinguished it.

Dr. Morgan did not know. The physician assured him that that was the trouble. He himself had a case where he took out one and one-half inches of the inferior maxillary, including one of the temporary teeth and the germs of two permanent teeth, the result of mercurialism, as

he was assured by the father of the boy. He has seen people whose jaws were closed so that the mouth could not be opened a particle. In one case a large slough occurred in the cheek, exposing the teeth, which was remedied by a plastic operation. A friend of his died recently to whom was administered within eight hours three hundred and sixty grains of calomel. As to symptoms, the first is an unusual flow of saliva; then there is tenderness of the periosteum and soreness of the teeth until they sometimes become tender and loose. The gums become tender and partially lose their density. They are easily cut, and very little pressure will break them at the margin. He had seen two square, clean-cut cases of ptyalism from the hands of a homœopathic physician. There is a peculiar odor which, when it becomes familiar, can be detected without making an examination of the mouth. In the cases which had come into his hands he has removed the necrosed bone and referred the patients back to the family physician for treatment. An old friend who died recently was salivated many years ago, and the gums never recovered entirely. A few years before his death rapid absorption took place in the alveolar process until all of the teeth were loosened and almost ready to drop out, and he recognized that it was the consequence of the salivation that had occurred years before. At one stage we have the purple appearance of the gum alluded to by Dr. Barrett, which is a chronic inflammation with stagnation of the blood.

Dr. J. J. R. Patrick, Belleville, Ill., read the second annual report of the examination of human crania in the museums of the United States. An abstract follows:

The report presented an abstract of the first eight volumes of the records of the investigation, covering the examination of the teeth and jaws of human crania in the Peabody Museum of Harvard University, conducted by Dr. R. R. Andrews, Dr. Jos. King Knight, and Mr. G. W. Newton, anatomist. The total number of teeth examined was 8468; number diseased, 2493, a percentage of 29.4.

The upper teeth numbered 5647, of which 1451 were diseased, a percentage of 33.04. The total of lower teeth was 2826, of which 627 were diseased, a percentage of 22.2.

The number of diseased teeth on the left side was 1273; on the right, 1220; an excess of the former over the latter of 4.17 per cent.

The teeth examined included examples from the ancient Peruvians, 3439, of which 1451, a percentage of 42.2, were diseased. California Indians, 4770; diseased, 1741; percentage 36.7. Stone Grave Indians of Tennessee, 1295; diseased, 297; percentage, 23.

Measurements to determine the width of arch and depth of palate were taken, as follows:

	Millimeters.	Inches.
1 Terra del Fuegan, width of arch	34	1.375+
depth of palate.....	29	1.14+
2 Massachusetts Indians, width of arch.....	37	1.5+
depth of palate.....	28	1.1094+
356 Peruvians, width of arch, average.....	38	1.504+
327 " depth of palate, "	26	1.0545+
2 Peruvian children, width of arch, average.....	30	1.22+
depth of palate, "	29	1.172+
8 Mexican—Coahuila, width of arch, "	38	1.591+
depth of palate, "	25	1.00
2 Mexican children, width of arch, "	35	1.422+
depth of palate, "	14	.595

pared with ancient times, will be considerably disturbed. Although only a limited number of crania have been tabulated, all the lesions presented in our race to-day are found in a great number of the pre-historic crania, and it would seem that caries was almost as prevalent at that time as now; that consequently caries of the teeth is not a disease of civilization. If this investigation establishes nothing further than that fact, it will be of great value to us. With reference to the measurements given, you will notice that Dr. Patrick has very little faith that any very available deductions can be established by them. He was pleased, however, that Dr. Patrick has concluded to make these measurements of the maxillaries. They will at least furnish data to be used in proving or disproving that certain mental qualities are always associated with peculiarities in the development and shape of the jaws. The work of tabulation is being done so thoroughly that it will probably not have to be done again. It is a work that will not only be a monument to Dr. Patrick, but to the American Dental Association.

Dr. Ottofy was pleased with the report as far as it goes, and he felt satisfied that when completed it would probably be the greatest work that this or any other dental association has ever undertaken. It is interesting to notice the various deformities and conditions that existed in pre-historic times which also exist now. There is also a decided advantage in going over crania in search of these things, because much that is covered by gum-tissue during life can be seen in the naked crania.

Dr. Kirk, chairman of the Committee on State and Local Organizations, reported a list of questions to be issued to the local societies in accordance with the plan proposed and by authority of the American Dental Association. The report was received, and the list of questions authorized to be issued.*

Adjourned to 9 A.M., Friday.

FOURTH DAY.

The association was called to order at 9.40 A.M., President Walker in the chair.

On motion of Dr. Crouse, Dr. John B. Rich, Washington, D. C., read a sketch of the action of the dentists in relation to the H. R. Bill No. 7696 of this Congress, commonly known as the Willcox bill, in which was outlined the progress of the movement against the attempted classification of dentists as manufacturers. At the annual meeting of the Maryland State Dental Society, in May, attention was called to the bill above named, and a committee composed of Drs. R. B. Winder, chairman, Ed. Nelson, T. S. Waters, A. J. Volck, W. A. Mills, David Genese, and W. S. Twilley, was instructed to use every means possible to prevent the passage of the bill as presented (see DENTAL COSMOS, July, 1892, page 583), and to endeavor to have it so modified that it could not be applied to dentists. The committee placed itself in communication with the members of Congress from their state, urged every dentist in the state to bring all the influence they could command to prevent the passage of the bill, and sent to all members of Congress a copy of an exhaustive argu-

* See DENTAL COSMOS for September, 1892, p. 755.

ment, prepared by the chairman of the committee, against the action of the Census Bureau in classifying dentists as manufacturers, when their calling is universally recognized as a liberal profession. Dr. Winder then personally laid the matter before all the state societies he could reach, and communicated with others, with the result that committees were appointed from the state societies of Connecticut, New York, New Jersey, Pennsylvania, Maryland, North Carolina, and the District of Columbia, which organized under the name of "The Associated Committees of the Dental Societies," electing Dr. Rich as chairman. By this time the bill had passed the House and was in the hands of the Senate committee.

An amendment was then prepared, to be inserted at the proper place, as follows :

" Provided, That nothing in this act shall be construed as authority to collect statistics from professional men, such as lawyers, physicians, and dentists."

This amendment was sent out with a circular letter urging upon dentists immediate action to bring all the influence possible to bear upon Congress, and particularly upon the Senate, to have the amendment introduced before the bill left the census committee. A number of senators were also induced to become interested in the case, in case the hearing before the Senate committee should fail.

There were present at the hearing, Drs. R. B. Winder, William A. Mills, and W. S. Twilley, of Baltimore ; J. D. Thomas, of Philadelphia ; Charles A. Meeker and F. C. Barlow, of New Jersey ; and H. B. Noble and John B. Rich, of Washington. The case was presented by Drs. Rich, Thomas, and Twilley. Superintendent Porter and the superintendent of manufactures endeavored to show that they had only attempted to collect statistics concerning mechanical dentistry. After discussion, in which members of the census committee took a hand, Mr. Porter disclaimed any wish to place the dentists in a false position, and indicated his willingness to take them out of the classification they complained of.

In reply, Dr. Rich said that if the superintendent would agree over his own signature to carry out the spirit and purpose of the proposed amendment, the dentists would be satisfied. He also insisted that the matter should be arranged at once in the presence of the census committee, which course was adopted. The agreement was drawn up and signed by Superintendent Porter, and the associated committees withdrew their opposition to the bill. (The agreement will be found at page 669, DENTAL COSMOS for August, 1892.)

The associated committees therefore begged leave to report that they had been successful in their resistance of the iniquitous proceeding of the superintendent of the census. The agreement remained in the possession of Dr. Rich, to be disposed of as the American Dental Association shall direct. The associated committees respectfully suggest that copies of it should be distributed all over the country ; that this sketch, the objectionable bill with the proposed amendment, and the agreement, be printed in a circular. The sketch concluded with an estimate of prices for the printing.

On motion, the report was accepted and referred to the Publication Committee.

A discussion having arisen on the question of what to do with reference to the statistics already collected from dentists by the Census Bureau, Dr. Rich stated that Superintendent Porter thinks he has the moral right to publish them. If any movement is to be made looking to their return to the parties from whom they have been collected, it should have the support of the association. He also wished to know who should have the custody of the agreement. He thereupon tendered it to the association, and on motion of Dr. Shepard it was accepted.

Dr. Barrett moved that the secretary be instructed to place the agreement in the hands of Dr. Rich, for whatever purpose it might be useful in securing the return of the statistics already collected.

Dr. Allport moved, as a substitute, that the agreement be directed to be placed in the custody of the secretary of the association, to be kept in a safe place, and a certified copy be delivered to Dr. Rich. Accepted by Dr. Barrett, and by vote adopted.

On motion, Dr. Rich was appointed a committee of one to represent the association at Washington, acting in conjunction with the Executive Committee in securing the return of statistics.

Dr. Taft, from the Committee on Necrology, reported a minute expressive of the feeling of the association with reference to the death of Dr. John Allen, which was adopted by a rising vote.

On motion of Dr. Harlan, the thanks of the association were tendered to such railroads as had made concessions in rates, and to the local Committee of Arrangements, more especially to its chairman, Dr. M. O. Cooley.

Dr. Crouse wished to correct a false impression that the work of the Dental Protective Association was about through. On the contrary, it was only just begun, and he urged upon those who were already members to take hold and work in their respective states to increase the membership. He hoped the association would have a membership of ten thousand within the next four years.

The association then proceeded to the election of officers (the result of which was published in the DENTAL COSMOS for September, 1892.)

The new president was installed, and returned thanks for the honor bestowed upon him. Dr. Crawford, the first vice-president, being called for, also returned thanks.

The association adjourned to meet in Chicago, August 15, 1893.

ODONTOGRAPHIC SOCIETY OF CHICAGO.

At the annual meeting of the Odontographic Society of Chicago, held at the Commercial Hotel, Monday evening, December 12, 1892, the following officers were elected for the ensuing year: R. B. Tuller, president; G. J. Dennis, vice-president; T. A. Broadbent, corresponding secretary; U. G. Poyer, recording secretary; Edmund Noyes, treasurer; R. B. Tuller, H. H. Wilson, U. G. Poyer, C. E. Meerhoff, D. M. Gallie, board of directors; G. N. West, F. K. Ream, F. H. Zinn, board of censors.

T. A. BROADBENT, *Corresponding Secretary.*

ALUMNI ASSOCIATION, NEW YORK COLLEGE OF DENTISTRY.

At the annual meeting of the Alumni Association of the New York College of Dentistry, held at the American Society of Mechanical Engineers, 12 West Thirty-first street, New York city, the following gentlemen were elected to office: Sherman B. Price, D.D.S., president; M. Charles Gottschaldt, M.D., D.D.S., first vice-president; H. J. Parker, D.D.S., second vice-president; Vincent M. Munier, D.D.S., secretary; Zachary T. Sailer, D.D.S., treasurer. J. Howard Reed, D.D.S., M.D.S., chairman; E. S. Robinson, D.D.S.; F. A. L. Wallin, D.D.S., executive committee.

VINCENT M. MUNIER, *Secretary*,

102 W. Ninety-fifth street, New York city.

DENTAL SOCIETY ANNOUNCEMENTS.

ELEVENTH INTERNATIONAL MEDICAL CONGRESS.

THE eleventh International Medical Congress will be held in Rome, beginning the 24th of September, 1893, and continuing until the 1st of October.

The Committee on Organization, following the precedent established in London in 1881, has provided for a Section of Odontology. As America has contributed pre-eminently to the scientific progress of dental surgery, it is hoped that the dental profession in America will be creditably represented. All reputable practitioners are entitled to membership in that Section.

The time chosen is the most delightful of all the year, and to those who have never visited the "Eternal City" the meeting of the congress will afford a rare opportunity.

The North German Lloyd Steamship Company have an established line of first-class steamers to Genoa, making the passage in less than eleven days. It proposes to reduce the fare to Genoa by twenty per cent., and the return trip by ten per cent., to those attending the congress. The French Railway Company has also offered a reduction of fifty per cent. on its fare.

Dr. Norman W. Kingsley, 115 Madison avenue, New York city, has been appointed member of the American National Committee for the promotion of the interests of the Odontological Section. All communications in reference to that Section should be addressed to him.

A. JACOBI, M.D.,

Chairman of the American National Committee.

ST. LOUIS DENTAL SOCIETY.

THE St. Louis Dental Society has arranged for a series of clinics, in operative and mechanical dentistry, to be given in that city on Wednesday, Thursday, and Friday, March 15, 16, and 17 next.

It is the intention of the society to make this one of the most interesting and instructive meetings ever held in the West. They want every reputable dentist in the country who can, to be present. There will be a chance to show what they have that is new, and see what others can do.

A. H. FULLER,	} <i>Committee.</i>
J. W. WICK,	
W. M. BARTLETT,	

THE C. N. PEIRCE DENTAL SOCIETY.

A SOCIETY to be known as the C. N. Peirce Dental Society has been inaugurated at the Pennsylvania College of Dental Surgery during the present session. The purpose is to promote general intercourse among the students, and incite them to scientific research. Every member is given a certificate of fellowship on taking his degree from the college. The first meeting was held on December 2, 1892, when the dean of the college, Dr. Peirce, read a paper before the society, which was much appreciated. The officers elected are: James Manning, St. John, N. B., Canada, president; E. Thayer, Chattanooga, Tenn., vice-president; H. H. Laubach, Philadelphia, treasurer; R. C. Talbot, London, Ont., secretary. The executive committee are: F. Brandreth, Philadelphia, chairman; Miss L. Benton, New York; F. Farrow, Middle Valley, N. J.; W. Warren, Philadelphia; T. H. Harvey, Scranton, Pa.

EDITORIAL.

WE direct special attention to the change in the time of meeting of the World's Columbian Dental Congress, which is now definitely fixed for Monday, August 14, to Saturday, August 19, inclusive, the reasons for which are set forth by President Bonney, of the World's Congress Auxiliary, in his letter to Dr. A. O. Hunt, secretary of the executive committee of the World's Columbian Dental Congress, whose communication is published in full at page 131 of this issue.

THE final report of the committee appointed by the American Association for the Advancement of Science for the revision of the spelling of chemical terms was adopted by the association at its meeting in Washington, D. C., during August, 1891, and not at its Rochester meeting, as stated in our editorial for December, 1892. The final *e* is retained in the spelling of doubly unsaturated hydrocarbons, as follows: butine, ethine, heptine, hexine, pentine, propine, quartine, sextine, etc. We find that only a limited number of reprinted copies of this important report are in the hands of the committee of revision, but the Bureau of Education at Washington is issuing an edition in the form of a small wall chart to be distributed to high schools and colleges. Messrs. Funk & Wagnalls Co., New York, have issued a circular on "Chemical Nomenclature," giving the reasons why they decided to adopt the improved spelling, in which appears also a discussion of the most important and radical changes recommended by the committee. These publications may be obtained free of charge by addressing the parties named above.

We have copies of upwards of one hundred letters from prominent chemists, many of them teachers, who have given their unqualified approval to the new spelling of chemical terms as noted.

THE DENTAL TRIBUNE, "a newspaper issued every Saturday," is a new candidate for professional favor, which made its appearance with the issue dated December 17, 1892. It is under the able editorial management of Dr. Louis Ottofy, of Chicago, long and favorably known in connection with the editorial department of the *Dental Review*. A dental weekly is a novelty in this country, where there certainly should be a field for a well-conducted periodical of this kind. We wish for the new enterprise much success; but we question the propriety of admitting the kind of matter embodied in the "New York Letter" in the issue of January 14, for be the statements there made true or untrue, the innuendoes based upon them are in any event scurrilous, and their anonymous character only serves to intensify their unrighteousness. Our views upon this anonymous form of personal criticism have been fully expressed in previous issues, and we regret that any reputable dental journal should lend its aid to such invidious attacks upon professional character or standing by giving them publication.

OBITUARY.

DR. ALONZO P. BEALE.

DIED, at his residence in Germantown, Philadelphia, January 4, 1893, of congestion of the lungs, ALONZO P. BEALE, D.D.S., in the thirty-sixth year of his age.

Dr. Beale was born in Philadelphia, February 7, 1857. He commenced the study of dentistry under the preceptorship of his father, Dr. S. T. Beale, and his brother, Dr. S. T. Beale, Jr., in September, 1874, afterward entering the Pennsylvania College of Dental Surgery, where he graduated in February, 1879. He was president of his class for two terms during his college course, and shortly after graduating was made demonstrator and lecturer on prosthetic dentistry in the college which was his *alma mater*. Dr. Beale made a specialty of the mechanical treatment of fractures of the maxillæ, and was frequently called in consultation by leading surgeons for his services and advice in these cases. He was the author of the sections on "Artificial Dentures on the Rubber Base," and upon "Dental Splints," in the "American System of Dentistry." He was a member of the Pennsylvania State Dental Society and of the Odontological Society of Pennsylvania. He was married November 3, 1883, to Miss Mary Ash Thomas, of Germantown, who with two children, a boy and a girl, survives him.

Dr. Beale was a typical Christian gentleman, kind, patient, and gentle in all his life relations,—a man who, without exception, was beloved by all who knew him,—a successful practitioner of a high order of talent, and one who, though cut off so suddenly, leaves an enviable record both as a practitioner and as a man.

At a meeting of the faculty of the Pennsylvania College of Dental Surgery held January 9, 1893, the following resolutions were adopted:

Resolved, That in the death of Dr. Alonzo P. Beale, who for thirteen years

filled the position of demonstrator and lecturer in the Pennsylvania College of Dental Surgery, the faculty recognizes the loss not only of a teacher of rare ability, but of a man whose admirable personal qualities endeared him to all with whom he was associated.

Resolved, That a formal expression of the heartfelt sympathy of the members of this faculty be conveyed to the family of their deceased coadjutor, with the assurance that their profound regret at his untimely loss will be fully shared in by every student and alumnus of the institution.

(Signed) HENRY LEFFMANN, *Secretary of Faculty*.

MEMORIAL RESOLUTIONS

Adopted at a meeting of the First District Dental Society of the State of New York, January 10, 1893 :

DR. JOHN ALLEN.

WHEREAS, In the death of Dr. John Allen, late of New York city, this society has lost one of its oldest and most honored members, whose life was one of faithful, devoted, and distinguished service, ever laboring for the advancement of his profession ; and

WHEREAS, He attained the highest position in his special branch of dentistry, rendering services which will long be remembered by his profession, who recognized him as the discoverer of that most beautiful and life-like improvement in prosthetic dentistry known as "continuous-gum work ;"

Resolved, That this society deeply mourns his loss, and desires to extend to his sorrowing family its sympathy and condolence, and that these resolutions be spread in full on our minutes.

W. W. WALKER, }
A. L. NORTHROP, } *Executive Committee.*
DELOS PALMER, }

DR. MILES H. DODGE.

WHEREAS, Death has removed from our number a brother and friend, Dr. Miles H. Dodge, of New York city ;

Resolved, That by his death we lose one of our esteemed members, who had been identified with this society for many years. We recognized in him a man of true worth, a fellow-practitioner whose professional deportment was above reproach ;

Resolved, That to his bereaved family we offer our deepest sympathy, and that a page in our minutes be set apart to his memory, and that a copy of these resolutions be forwarded to his family.

W. W. WALKER, }
A. L. NORTHROP, } *Executive Committee.*
DELOS PALMER, }

DRS. L. M. SLOCUM, SR., AND L. M. SLOCUM, JR.

WHEREAS, We have learned with deep regret of the death of Dr. L. M. Slocum, Sr., and Dr. L. M. Slocum, Jr., father and son, both active members of this organization ;

Resolved, That by the death of the elder Dr. Slocum the profession has lost one of its most efficient members, whose labors in his peculiar field of dentistry should be recognized by this society as worthy of commendation ; and

Resolved, That in the death of Dr. L. M. Slocum, Jr., our society has lost a member whose energy of character and devotion to his profession gave promise of a brilliant future ;

Resolved, That this society extends to the bereaved wife and mother of the deceased its heartfelt sympathy, and that a copy of these resolutions be spread in full on our minutes.

W. W. WALKER, }
A. L. NORTHROP, } *Executive Committee.*
DELOS PALMER, }

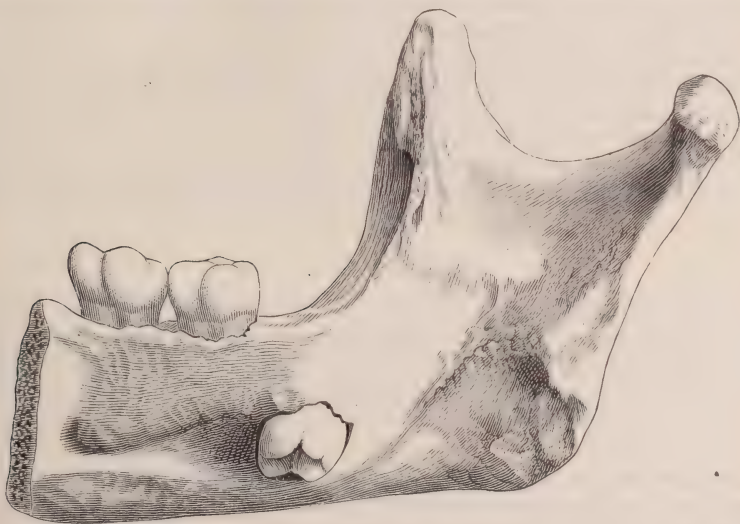
HINTS, QUERIES, AND COMMENTS.

WE are pleased to be able to note that the *Medical News*, published by Lea Bros. & Co., Philadelphia, in its issue of December 24, 1892, adopts the changes in the spelling of chemical terms recommended by the American Association for the Advancement of Science, as noted in the editorial of our December, 1892, issue, giving the DENTAL COSMOS due credit for the information.

WILL some one who solders aluminum give the component parts of the solder and flux he uses, and how they are applied? Don't quote the text-books, as they give no particulars.—NOVICE.

GOLD ALUMINUM ALLOY.—According to Professor R. Austen, a gold alloy containing twenty per cent. of aluminum possesses the remarkable property of melting at a higher temperature than gold alone. This is an exception to the general rule that an alloy melts at a temperature below the melting point of its least fusible constituent. It is remarkable that the alloy of ninety per cent. gold and ten per cent. aluminum follows this rule. These aluminum alloys of gold possess beautiful colors; that containing twenty per cent. aluminum is ruby red, those with larger admixtures of aluminum are purple.—*Zahntechnische Reform.*

THE accompanying illustration represents the remarkable case of abnormal eruption of the third molar referred to by Dr. J. M. Whitney, of Honolulu, in his paper which appeared in the preceding issue of the DENTAL COSMOS, and is described on page 7 of that number. The illustration reached us after the



paper had gone to press, but as it so perfectly represents this remarkable case and so fully tells its own story, we publish it here as a matter of interest and record as a contribution to the history of dental abnormalities.—ED.
DENTAL COSMOS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I met with an accident to-day, the possibility of which is, I think, not mentioned in any of the text-books on prosthetic dentistry. Dr. Ottolengui once said in the DENTAL COSMOS, "Report your failures; they are lessons to all," and as I am sure the same accident might easily occur to others, it seems right to publish this account, that it may serve as a warning. It happened in the following manner: A fellow-student had melted the zinc for a die to help me through with my work, and when I came to pour the zinc which was in the crucible over a gas flame, not knowing whether the metal was overheated or had become solid again, I took an iron rod to stir the metal; but at the moment the rod touched the mass an explosion followed, throwing half of the molten zinc high in the air, and a portion, though happily a small amount, splashed into my face, burning some deep holes, and if it had not been for my spectacles I should have lost an eye. As it was, I escaped with a "blue eye." I do not know what was the cause of the explosion,—perhaps the zinc was overheated, or the rod was too cold, or possibly wet.—HANS BLOCK, Pennsylvania College of Dental Surgery.

SODIUM PEROXID (Na_2O_2), until recently known only as one of the rarer products of the chemical laboratory, has by means of improved processes been produced in England at a cost which places this interesting substance on a commercial basis, and it is now offered as an economical bleaching agent for silk, wool, and other materials and fabrics. This compound is the chemical analogue of hydrogen peroxid, but it possesses the important advantage of containing about twenty per cent. of available bleaching oxygen, as against only about three per cent. of available oxygen in the ordinary fifteen-volume aqueous solutions of hydrogen peroxid as found in the market. Theoretical considerations seem to point to sodium peroxid as the material *par excellence* for bleaching discolored teeth in the mouth, and as a germicide and antiseptic in the treatment of the putrescent contents of pulp-canals. The few cases in which has occurred an opportunity to test it have shown remarkably satisfactory results, both as to its rapid bleaching effect and also as to its antiseptic properties. An investigation of this new product for the purposes indicated is now in progress, the results of which will form the subject of a full report by the writer, in an early issue of the DENTAL COSMOS.—EDWARD C. KIRK.

FOR soldering aluminum, the *Rural Collaborator* recommends the use of silver chlorid as a flux. The surfaces to be united are placed together and finely powdered; silver chlorid is placed at the line of union. The solder is melted by the blow-pipe in the ordinary manner. It is not stated what kind of solder is used.—*Zahntechnische Reform*.

TO preserve the remaining contents of ethyl chlorid tubes after having used a portion, M. Fosse, of St. Etienne, closes the end of the capillary tube by partially fusing it by means of the ordinary gas blow-pipe flame, and while the glass is in a soft state, pressing the sides together with a small pair of pliers, the body of the tube being meanwhile immersed in a vessel of ice-water. The place where the point is to be afterward broken off is marked by a file-scratch.—*Zahntechnische Reform*.

To get a tin model on which to vulcanize, a plaster cast free from imperfections or blisters is carefully dried and dipped into molten stearine. When hardened, a sand mold from this model is made in the usual way, into which tin is poured, and when slightly congealed at the edges the still fluid portion of the tin is poured back into the melting ladle. A thin shell of tin will be left as a lining to the sand matrix. This shell furnishes a perfect model after the hollow interior is filled with plaster. If the repouring is delayed too long the tin shell will be found to be too thick, but the right moment for repouring will be easily found by a little experience. Before the plaster of Paris is poured into the tin shell, the latter is to be cut at different places with a very thin saw from the outer margin toward the alveolar ridge. These thin incisions will permit the removal of the tin shell after vulcanizing, by bending the sections of tin to the inside, so that the plate may be readily separated from the model. Plates so vulcanized need no further polishing on the palatine surface.—*Zahntechnische Reform.*

A REMEDY FOR THE AFTER-PAINS OF TEETH-EXTRACTION.—A potent and reliable remedy for the immediate after-pains of teeth-extraction, whether general or local anesthetics are used or not, is amyl nitrite (Powers & Weightman or Rosengarten & Sons), the patient to inhale the preparation about three or four seconds, and then to *sit still* in the chair for about five minutes, or until the amyl nitrite has spent its primary force. As a matter of fact, the remedy should be kept in every office, dental and medical, where anesthetics are used. A single drop of nitro-glycerin, one per cent. solution, *in half a glass of cold water*, is even better than amyl nitrite, and more lasting in its effects. Both remedies are of marvelous benefit in neuralgias of all kinds, and both will oftentimes *cure* the bad headache following dental operations. In angina pectoris, one of the most dreadful of all cardiac affections, nitro-glycerin is almost a specific, so far as relief of pain is concerned, although not curative of the frightful malady. Intense fear, such as is exhibited by nervous patients in visiting a dentist for tooth-extraction, will sometimes bring on an attack of angina pectoris in patients with weak hearts; hence it behooves the dental surgeon in full practice to be prepared for emergencies of all kinds, and to be able to cope with them successfully when he meets them.—EDWARD H. BOWNE, M.D., Kingston, N. J.

A NEW MEANS OF MOUTH-LIGHTING.—The help afforded to a successful diagnosis by means of a powerful and convenient form of incandescent lamp, and the benefits derived therefrom, have been unappreciated in the past; and considering the rapid advance made by the dental profession in the line of appliances, it seems all the more remarkable that up to the present time we have been satisfied with the somewhat cumbrous and inefficient means of lighting so far given.

The medical profession is ahead of us in this respect. It has caused the electric companies to manufacture all kinds of useful lamps, and it is due to that profession that we enjoy that which I consider to be a great privilege,—the use of the lamp to which I wish to call attention. It was made for surgical use in intra-uterine work, and consists of a glass tube, seven inches long and three-eighths of an inch in diameter, the light end being rounded and slightly constricted, forming a neck, the other end being covered with hard rubber for the space of an inch or so, into which the wires pass.

The light given by the dentoscopes we have never exceeds in illuminating power that of one-half candle power ; in connection with this a mirror is so placed as to admit of but little degree of variation in reflecting the light. These are drawbacks to much efficiency in their use.

The intra-uterine lamp is made to give six-candle power (twelve times the light given by the others), with but six volts, the current obtainable from a storage battery of three cells or from a Partz acid gravity battery of six cells, and is most convenient in size and shape, and free from any mirror attachment. This is a decided advantage, for it can be carried to any point within the mouth, and with the mirror in the other hand its rays can be thrown in any direction. These lamps are used for inspection only, as the heat evolved precludes their use any great length of time in the mouth.

The light being more intense, as has been shown, vastly extends the field of its usefulness ; by its use the differentiation of vital from devitalized teeth, not always an easy matter, becomes sure in its accomplishment ; a hidden cavity, no matter how small, is demonstrated ; the minute unevenness in cavity-edges when prepared for the gold is all too plainly apparent ; the line of approach of pulp-chamber to cutting-edge, the knowledge of which is so important at times, is shown ; the doubt as to enamel being checked or cracked is cleared up ; and many other uses I need not mention are subserved.

The lamp is not costly ; the sum of four dollars and fifty cents covers its purchase.

It can be hung near to or from the bracket, with a push-button set by the chair in easy reach of the operator's foot, and the connection so made.

A resistance coil is a necessity, for the voltage may at times be too great for the safety of the lamp, and by this the current is regulated in accordance with the need as indicated by the voltmeter, or, as the operator becomes proficient, as indicated by the color of the light. This is a small matter as far as work is concerned, however, for occasion to regulate may not be had once in a month, the state of the weather, dry or damp, having to do with this.

The life of the lamp is generally from seven hundred and fifty to one thousand ampere hours. I believe it to be a great aid to accuracy in our work, and take pleasure in calling the attention of the profession to it.—W. B. SHERMAN, D.D.S., San Francisco, Cal.

THE AUTOMATIC MALLET.—Articles have from time to time appeared in the DENTAL COSMOS either lauding or depreciating the automatic mallet. From an unbiased standpoint, as I have seen the workings of the hand-mallet and have practiced with the automatic and electric mallets, I am led to advocate the use of the automatic. I have found, so far as my personal experience and observation goes, that those who array themselves most formidably against the automatic mallet have been dentists who fail to carry out the fine details in its working, which, if properly observed, are destined to fulfill the highest requirements. In other words, they lack that peculiar ability to overcome its objections ; and that there are objections to the automatic mallet I do not deny. I have seen more failures with the hand-mallet than with any other mallet. I recognize this to be a very broad assertion, but I do not say that good fillings cannot be introduced by means of the hand-mallet, for I have seen some excellent cases from a few skillful dentists by means of that instrument ; but the very fact that fillings can be more easily inserted with the hand-mallet, and with less skillful care than with the other methods, tends to

make dentists less skillful, less observant of details, or, in fact, very careless. Entirely too many dentists employ the foot-plugger point too early in the operation. I believe this to be a great feature in the failure of fillings, and a failure which can best be rectified and overcome by the professors and demonstrators who superintend the dental-college clinics. The fault with the foot-plugger point is that the operator employing it quickly recognizes that it shortens the work, which is always an advantage when properly done; but to shorten the work with a foot-plugger point too early in the operation is a grievous mistake, as one is apt to run over enamel-margins too soon, or leave pits and imperfections in the filling. Again, the foot-plugger covers considerable ground, and no instrument will throw a filling out of position so readily as the foot-shaped points of the automatic mallet, because of their many shapes and because of the inability of the operator to calculate exactly at what point the force will land (which can always be easily calculated in using a small round point); hence the force will often dislodge the filling unless it be previously well anchored and wedged by careful attention to every detail of the operation. Now, it is a recognized fact that one cannot so readily employ the foot-plugger point in the automatic as in the hand-mallet, as more precision and more correct handling is required; hence the objection to the automatic mallet. The greatest objection to the automatic mallet appears, however, to be the liability of fracturing the enamel-wall or chipping the enamel-margins. The liability to do this with the automatic mallet, if in the hands of a skillful dentist, is not greater than with the hand-mallet, but it does occur very often to those who have practiced with the hand-mallet and have attempted to use the automatic, even to those who have first made themselves skillful in the handling of the automatic. In employing the automatic mallet it is necessary to start the filling with hand-pressure, carefully applied so that the retaining-pit or groove and undercut are packed tight; then at the proper time employ the automatic, using at first a light blow, then medium, and resorting to hand-pressure for all deep undercuts, especially those in approximal cavities of front teeth, and, above all, being careful not to mallet directly against the enamel-margin, but always letting a pellet of gold precede the fine plugging-point, which pellet of gold should be malleted against the preceding piece or pieces until the filling is flush with the margins of the cavity. Then the gold should be run over the enamel-margin by malleting on additional pieces, in such a manner that the gold will run over the enamel-margin without depending upon enamel for support. In that case, when the filling is dressed down, there will be a thin film of gold over the margin, so that neither an exploring-needle nor fluids can get between the filling and the margin. When the cook wants to prevent the juice from getting between the dough and the pie-pan, she presses the dough against and slightly over the edge of the pan. Fillings introduced by the hand-mallet will not resist the sand-paper disks, gold finishing-burs, and finishing-files as well as those introduced with the automatic, and are more liable to chip flake by flake. This has been not only my observation, but that of many. In the Snow & Lewis single-action automatic plugger, the operator can employ the double, long, powerful blow produced by revolving the ring on the barrel to the right, which to my mind is cruel, dangerous, and unscientific. It is my pleasure to state that patients who have experienced the use of the hand-mallet always express themselves highly in favor of the automatic, claiming that it produces less pain and less jarring of the teeth and head. Having the left hand free, one

can, if necessary, support the chin, teeth, or head, and reflect light into the cavity by aid of the mirror, always independent of an assistant. I believe in all methods being taught, for we always find those who are more skillful in the use of some one of the various methods, and I believe in him following the method in which he finds himself most skillful; but I do not believe teachers in dental colleges should uphold the use of the hand-mallet, for example, and depreciate the automatic, simply because they personally happen to follow the former method, and this seems to be the case in many colleges.—A. BUXBAUM, Cincinnati, O.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER, 1892.

- December 6.*—No. 487,647, to G. B. SNOW. Vulcanizer.
 “ “ No. 487,670, to J. W. HAUGHAWOUT. Rubber-dam clamp.
December 13.—No. 487,726, to J. A. ELLARD. Regulator.
 “ “ No. 487,843, to H. R. KLINE. Pneumatic plugger.
 “ “ No. 487,973, to BENJ. SIMONS. Separator.
 “ “ No. 488,008, to J. G. HOLLINGSWORTH. Crowns.
December 27.—No. 488,634, to W. D. PORTER. Gold filling.
 “ “ No. 488,707, to SAMUEL CLOUTIER. Chair.
 “ “ No. 22,259, Trade-Mark, to H. B. FOULD. Dentifrice.
 “ “ No. 22,260, Trade-Mark, to R. RICHTER. Cement.

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ORIGINAL COMMUNICATIONS.

— — —
"THE HERBST METHOD OF TREATING PULPS."

BY A. W. HARLAN, M.D., D.D.S., CHICAGO, ILL.

(Read before the First District Dental Society of the State of New York, January 10, 1893.)

IN presenting this paper, I desire to state that it will be seen that I differ with the author of the paper presented at the meeting of the Dental Society of the State of New York, held last May in the city of Albany. Yet in doing so I must say that there is no one who has a higher opinion than I have of the scientific attainments of the author of that paper, who, in a certain sense, was the spokesman of Dr. Herbst; and when I speak of him in this paper as the historian, or the narrator, or the spokesman, you will understand that it is done simply for the purpose of preserving historical accuracy. I wish to say further, that while some of the remarks that I make this evening may seem somewhat pointed, my sole desire in the discussion of any question relating to the theory or practice of dentistry is to arrive at the truth.

Some one has denominated higher criticism to be an effort to arrive at the truth. The following lines, therefore, are not written in the spirit of finding fault with the paper of Dr. C. F. W. Bödecker* read before the Dental Society of the State of New York at the late meeting held in Albany, but rather with the purpose of discussing whether there be sufficient merit in the procedures proposed, to entitle them to take place in our armamentaria. In presenting this theory of Dr. Herbst to the world of English readers, Dr. Bödecker becomes not only the spokesman, but in some measure the advocate, of a startling innovation in the conservative treatment of the dental pulp. It is unnecessary to summarize the various methods of pulp-treatment now in vogue as accepted practice, because there is no settled definite method in universal use in English-speaking countries. All methods of pulp-treatment and pulp-capping are subject to variations in detail, but all

*The Herbst Method of Treating Pulp. DENTAL COSMOS, October, 1892, page 773 *et seq.*

have the same object in view, viz: the prevention of death of the pulp. Since the introduction of arsenic into dental practice in 1836, various methods of destroying the dental pulp have been resorted to, but even now, after the lapse of more than half a century of discovery and invention, no positively certain method of destroying the pulp has been discovered or perfected that is as safe and certain as an application of one-sixtieth of a grain of As_2O_3 , commonly called arsenious acid. It is now proposed to *save* the pulps of teeth by making an application of cobalt and cocain hydrochlorate. What is cobalt? A metal, one of the elements usually found in connection with arsenic, and very rarely free from it. As a metal it is inert. Cobaltous oxid is an irritant poison, as indeed are the salts of cobalt in general. There are no indications in the paper that any particular form of cobalt is recommended. The author says, "If the pulp of a tooth is in such a condition that it becomes necessary to remove it, an application of *cobalt*, to which has been added about eight per cent. of cocain hydrochlorate, is made to it, and covered with wax or some other temporary filling-material. After two or three days the temporary filling is removed, the cavity cleansed from all decay, and rinsed out with water." In these days of asepsis and antiseptis, the above-described method of treating a pulp which is expected to live would hardly be thought conducive to its prolonged longevity. Does the author mean in this place to use cobaltous oxid 92 parts and cocain crystals 8 parts, and rub the ingredients together in a mortar until a homogeneous powder is obtained, or does he mean to take the cobalt oxid and an eight per cent. solution of cocain hydrochlorate in water and add them together? Cobalt oxid is almost insoluble in water, hence such a mixture would soon lose its coherence if often exposed to the air. Quoting again, the author says, "Then, if practicable, the rubber-dam is adjusted [this author, first of all, desires to save a pulp alive, and before doing so carefully infects it with water!], the cavity thoroughly disinfected, and the coronal portion of the pulp is amputated by means of a large, perfectly clean, sharp, round bur, which is rapidly revolved in the hand-piece of the dental engine. The bur must be nearly as large as the coronal portion of the pulp which is to be amputated." In analyzing these directions for treatment of the stunned pulp,—stunned by the cobalt and the cocain,—you must see at a glance the absurdity of having a round bur, in any number of sizes, that would approximate in shape the bulbous portion of a pulp in a central incisor, a cuspid, or in fact the shape of any pulp-chamber in any one of the thirty-two teeth. You will observe by the foregoing, also, that the cavity is to be disinfected. Why not adjust the rubber-dam before the temporary filling was removed? Quoting again, "The pulp-chamber is then to be washed out with a solution of corrosive sublimate of the strength of one-tenth of one per cent., and dried." This pulp, which is expected to live, is treated to another dose of poison, large enough, in some cases, to have produced ptyalism, but not toxic for the patient. The examination of this remarkable (!) contribution to science goes to show when traced to its ultimate *raison d'être* that the author is seeking for some plan which will enable him to escape the laborious removal of a pulp and the subsequent filling of the tooth-root. Listen to him again: "A cylinder or a

loosely rolled ball of No. 4 tin foil, as large as the cavity will admit, is now placed in the pulp-chamber directly over the amputated pulp-stump, and with a revolving smooth burnisher, which is smaller than the pulp-chamber, the tin is burnished firmly into it. In burnishing, care should be exercised not to press the tin directly upon the pulp-stump, but the force should be exerted more laterally. It is also necessary that the stump to be capped in this manner be not irritated with small burs, excavators, or nerve instruments, as failure has been observed in those cases in which this was done." The pulp of the tooth, after being in contact with cobalt and cocain, eight per cent., two days, being bathed with corrosive sublimate 1 in 10 until hemorrhage ceased, is now hermetically covered with tin foil and left to its fate. A recognition of antiseptics is found in this last paragraph, which is quite refreshing. The author says, "The stump . . . must not be irritated with small instruments,—burs, excavators, or nerve instruments." Just in what manner you could irritate a stunned, stupefied, dormant, decapitated pulp, unless a dirty instrument or bur was used to infect it, is past comprehension. Now, what is the object of this unremitting attention to an insignificant pulp-mass in a tooth where it has performed its function of building and sustaining the dentine? To save it alive, says the author. How is it saved alive? By hermetically sealing the root-canal. Here is his own language:

"The theory entertained by Dr. Herbst in regard to this treatment of the pulp is that by burnishing tin or gold into the pulp-cavity he creates an absolutely air-tight covering to the root-canal, which is not obtainable with other materials." How did he discover that a pulp could be kept alive by this method of treatment? In this wise? Herbst says, "Formerly, when during this process of excavating I exposed a pulp, I capped it with a soft cylinder of gold, burnishing it very carefully over the pulp. It sometimes happened that afterward the tooth decayed in another place, the filling coming out or the tooth being extracted, when in every instance upon opening the pulp-chamber I found it empty, and without the slightest perceptible odor. The color of these teeth was never changed much, and often there was no perceptible difference between them and the living. These cases led me to assume that the results were dependent upon the air-tight covering of tin or gold which had been burnished over the pulp by the rotation method of filling." The author of this quite original method argues that because in every instance the pulp dies when gold or tin is rotated hermetically over it, therefore it must be an excellent plan for preserving the pulp by first poisoning it, then mutilating it, and afterward rotating tin or gold over its mangled, bruised, and antisepticated remains. This is a very unique method of revivifying a body already pulseless, suffering from a stupor so profound that only a slight "sensitiveness to pressure is experienced for a few days when the tooth is shortened," so that it will not be antagonized by an opposing tooth.

In the last quotation from our very esteemed transatlantic brother, he says in opening into the hermetically sealed teeth there was no odor,—“not the slightest perceptible odor.” The narrator of the Herbst method, Dr. Bödecker, says, “In some instances we can open the pulp-chamber of a pulpless tooth, which usually contains a great deal of septic matter, clean it out, fill it at once, and no trouble

whatever will arise. In these cases the end of the root is encysted, and any kind of filling-material, or even no filling at all, will answer the purpose." Here we have science and observation pitted against each other; observation says the pulps die after being hermetically sealed,—die without odor; science says the ends of the roots are encysted, hence no change of color. Science is in error, however, in saying there is a great deal of "septic matter in the canal of an encysted root." Absence of odor, it is true, does not prove the absence of septic matter, but the encystment of the apex of the root proves that the septic (poisonous) matter is too feeble to cause the breaking down of the newly formed barrier at the apex. In other words, the contents of a pulpless root when the apex is encysted are harmless. You cannot plant them and get a growth of micro-organisms on agar-agar or sterilized potato. The ptomaines resulting from the disorganization of the pulp in a sealed root are oftentimes very poisonous, but they are never poisonous when the root is encysted. Quoting again from Dr. Herbst, he says "that he does not make much use of antiseptics in this connection [treating such cases], nor does he always apply the rubber-dam before he amputates the pulp." Dr. Bödecker very justly remarks that this "may probably account for the slight pericementitis of these teeth as described by him." He advises those who try this method to use the greatest care to prevent the entrance of organisms into the pulp-canals. In this I most heartily agree with him.

In the first tooth examined by Dr. Bödecker microscopically, he states that there is a layer of "necrotic pulp-tissue" with metallic particles at the outermost periphery of the pulp-stump remaining in the tooth. The pulp-tissue in the roots had been changed into fibrous connective tissue. The conclusions arrived at by the examination of this single specimen, decalcified in a solution of chromic acid, and one specimen broken up by the use of excising forceps, were, that the dentine in each tooth was alive; that the stumps of the pulps were alive is affirmed in one case by the deposition of secondary dentine, and in the other that the dentine of the crown of the tooth was alive at the time of its extraction.

The historian of this method of treating pulps says, "I will state that although these two specimens without doubt prove this treatment to be a great success, and one of the most valuable procedures ever discovered in dentistry, yet I would advise my professional brethren not to practice it too hastily." The narrator has treated fourteen cases, and gives a history of five, which an analysis shows consists of only three, as two of the pulps were amputated under a freezing process induced by using methylic spray. One case, No. 5, is not quite free from tenderness when the patient does not "feel well."

Cobalt is an agent which when used hypodermically on guinea-pigs, rabbits, kittens, and other similar animals, produces symptoms of poisoning similar to those produced by strychnin on the human adult. This is cobaltous sesquioxide (Co_2O_3). It is the familiar black hydrate, which unless chemically pure is usually contaminated with nickel sulfid or arsenious anhydrid (As_2O_3). We have arrived at a period now when a drug like this is used empirically in connection with cocain hydrochlorate, eight per cent.—not for purposes of destruction, but for the purpose of saving the vitality of a tooth-pulp.

Does the cocain prevent the absorption of the cobalt into the substance of the pulp, or does it stun it sufficiently to permit of amputation, and by its presence prevent the action of cobalt? These are questions which to my mind are easily answered. Cobalt being an irritant locally, paralyzes the sensory filaments of the exposed pulp, and if the pulp was previously not long exposed to external agencies, the cocain may have a little anesthetic effect in such a situation.

It is not clear to my mind just how cocain may be of benefit to the action of cobalt on the pulp, for when the cobalt is allowed to remain in contact with the pulp forty-eight to ninety-six hours it ultimately dies, no matter whether it be amputated and sealed hermetically with tin or any other metal "rotated over the pulp-stump with a burnisher fixed in the hand-piece of the engine." Cobalt when applied to the pulp of a tooth produces a tetanic state identical with that produced by woorari when injected into a frog, and if it is removed before dissolution takes place the pulp may be possessed of that low degree of vitality which will produce secondary dentine, but it is the precursor of death. There is nothing normal about the feeble vitality remaining in the pulp-stump; it is dying a lingering death, and the teeth remain free from tenderness because there is not yet established a smoldering volcano to set fire to the pericementum and adjacent tissues. I must respectfully decline to agree with the conclusions of the historian of Dr. Herbst's method of producing slow death of the pulp as being "one of the most valuable procedures ever discovered in dentistry." It were far better to destroy a pulp at once, and fill the roots, even though it is "one of the most difficult and tedious operations the members of our profession are called upon to perform," especially in handling the roots of the "first upper bicuspids, the buccal roots of molars, and the anterior roots of lower molars."

In the discussion that followed the reading of the "Herbst Method," neither the author of the treatment nor the historian could gather much satisfaction from this revolutionary method of providing a plan for an abundant crop of alveolar abscesses. Because pulps will live in spite of ill treatment occasionally, is no reason for placing all of them in a condition where the chances of their dying are as ninety-nine is to one hundred. If the author of this procedure had stated that his method was to be used in certain teeth, designating those which are considered most difficult to treat successfully, perhaps few would object to such an empirical practice. The question for us to consider is whether the exposition of the method with the data at hand is sufficiently strong for our whole number to abandon present successful, established methods for one which carries with it no conclusive evidence from its author or the advocates of the method that it is superior to those now in use. It is a very serious thing to put into practice an innovation which has neither a scientific nor rational basis for its support, and I ask you and the spokesman of Dr. Herbst if, taken all in all, it is not a very slender theory to hang your reputation upon in practicing such a method upon those intrusted to your care. Dr. Bödecker says in the discussion that "in amputating the pulp, care must be taken not to cut through to the bifurcation of the roots." Herbst says that "many of his failures resulted from cutting too near the bifurcation and then applying the tin cap." If a practice which

is proposed for general use has to rest on such delicate hair-splitting as this, where are we going to land? Why should there be a connecting link between the stumps of a stunned pulp in a bifurcated tooth? Suppose it were a single-rooted tooth, what would be the result? There is no connecting link there. This theory, the more it is studied, seems like a deep-laid scheme to cause another Sexton to arise and denounce all efforts to save or retain pulpless teeth in the mouth, because at some time or other the internal auditory nerve was excited to reflect pain to the ear in consequence of an unfilled root being in the jaw of the same side of the head. Should the method take hold of the unreflecting to any extent, it will require a period of five or more years to fully test it, and a further period of ten or more years to repair the damage it has done to the innocent objects of our experimentation. An innovation like this must, in order to attract the thoughtful, have fewer elements of disastrous possibilities in its basis of theory as a positive, conservative, beneficial procedure, and lacking naught but practice to make it a fixture in daily routine.

TROPACOCAIN AS A LOCAL ANESTHETIC IN DENTAL SURGERY.

BY ARTHUR C. HUGENSCHMIDT, M.D., D.D.S., PARIS, FRANCE.

(Read before the Society of Stomatology of Paris, January 17, 1893.)

TROPACOCAIN, or benzoyl-pseudo-tropein, is an alkaloid obtained from the leaves of a plant of the coca family which grows in Java, and has been isolated by Giesel. Liebermann obtained this product synthetically, but as the base is not very soluble in water he made a hydrochlorate, which is the one used in experimental researches.

Chadbourne, from Boston, who made a series of experiments on cold- as well as warm-blooded animals, arrived at the conclusion that the new drug was about half as toxic as cocain, and possessed the same local anesthetic properties without the accidents observed with cocain.

My observations on the human subject are in accordance with the facts observed by the above-named gentleman.

The introduction of tropacocain into the human organism by the stomach at a dose varying from one-third to three-quarters of a grain is followed by no signs indicating the physiological action of the drug.

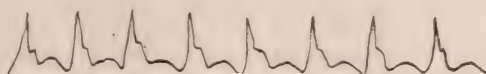
A sub-mucous buccal injection of nearly one-half grain of tropacocain in ten drops of water, on a total of thirty-seven persons (nervous, frightened, and others), has only produced a slight increase in the number of radial pulsations, say from eighty to eighty-four, without any changes in the arterial pressure as indicated by the touch, but I must add that in all these cases the injection has been made very slowly, lasting in each case for about one minute.

Although this drug by its chemical composition belongs to the atropin group, yet I have never observed the least pupillary symptoms, only a little dryness of the throat, very little developed, however, which is observed in certain cases several hours after the introduction of the drug. This would be the only symptom observed also with atropin, but yet with the dose used it is not sufficiently developed to

be ascribed absolutely to the drug and not to the imagination of the patient.

The injection of a massive dose of four centigrams of tropacocain—that is, a rapid injection of the whole contents of the syringe into the region of the gum of the inferior maxilla—has been followed three minutes later by a very distinct symptom of vertigo and very strong sensation of compression in the cardiac region, which was accompanied by a very sudden and notable fall in the arterial pressure, as is indicated by sphygmographic tracings obtained at that time. (See Figure.) This action on the circulation was a very rapid one, for ten minutes later the pulse, as regards tension and number of pulsations, had almost returned to a normal state without presenting any more variations, as indicated by the tracings which were taken up to four hours after the experiment.

Respiration, contrary to what occurs in intoxication by cocain, does not appear to be influenced by doses of two to four centigrams, a little more than one-third to three-quarters of a grain, while cocain in much smaller doses acts very promptly on the respiratory function at the beginning of intoxication.



Normal.



Three minutes after injection—toxic action.

On the nervous system the doses of tropacocain which I have used do not appear to have an action, while an equal part of cocain has produced most dangerous results. Cocain, in fact, is a cerebral anemiant, and a powerful one, and to that action are due the dangerous symptoms, syncope, etc., which occur at the beginning of an injection of cocain in a nervous or frightened person. We know, on the other hand, that fright produces as its physiological manifestation a cerebral anemia, hence there are two chances for one to have an accident with cocain. Tropacocain, however, does not seem to have any action on frightened persons, therefore acting as a cerebral anemiant. On the other hand, it does not seem, like cocain, to have an action on the vaso-motor system.

The results of observations on men are in accordance with those on animals, and indicate that this new product is much less toxic than cocain, without going so far as to say that it is without danger, as the observations which I have made after a massive injection of three-quarters of a grain indicate that the drug is an active one, and demands to be employed with caution. Its physiological action on the heart is very rapid when it occurs, for ten minutes after a very marked toxic action on the heart everything had returned to normal, while with cocain the cardiac perturbations last for hours.

As a local anesthetic, this new product appears to me to be a good acquisition to our materia medica and therapeutics. I have employed it

thirty-seven times, without using, however, more than one-half grain at a dose. The preparation which I have used is the following :

Tropacocain hydrochlorate, 2 grains ;
Distilled water, gtt. 1 (50). M.
S.—gtt. x for one local anesthesia.

The injections are made as in the case of cocain. The root or tooth to be extracted or region to be operated upon is surrounded by a series of injections of one or two drops of the above liquid until the ten drops have been used.

I have been able to extract roots, perforate the alveolus, and remove a sequestrum without the least complaint on the part of the patient, the injection itself being painless. The local anesthesia produced is much more rapid than with cocain, and commences forty-five seconds to one minute after the beginning of the injection. The anesthesia lasts longer and appears more developed than with cocain. But one point on which one must insist : that is, that this injection be not made suddenly ; at least one minute should be employed in injecting the dose. In this respect let me mention a method which I have used with success in several cases of cocain accidents, and that is, that as soon as toxic symptoms appear I introduce a lancet deep into the injected region, so that the flow of blood may wash out the part of the injected liquid which may not have yet passed into the blood-current, and so reduce the chances of too severe poisoning.

What makes me believe that this new product will advantageously replace cocain is because the benzoyl-pseudo-tropein hydrochlorate is a synthetical product, and consequently much less likely to vary than a similar product obtained directly from the plant ; and as it is this artificial product which has been experimented with, there is no reason why the physiological action of the drug should vary from one day to the other, as is the case with cocain. I had noticed, in fact, that out of my fifteen hundred hypodermic cocain injections made up to 1887, I had only observed four slight cocain accidents in using doses varying from one to one and one-half grains without any apparent symptoms. To-day I do not use over one-fifth of a grain, and have had accidents with one-quarter and one-fifth of a grain.

Was the cocain of the early days obtained from old coca leaves, and is the one of to-day derived from fresh plants which contain certain toxic matters not easily eliminated ? This I am not prepared to explain, but what I can say is that the cocain of to-day is much more toxic than the one of the early days.

I have used tropacocain in cases of sensitive dentine. In a few cases I have seen some action, but in the majority none at all. In a ten per cent. solution applied to mucous membrane, I found it less active than a similar preparation of cocain. In a word, the advantages of tropacocain over cocain are :

1. Used in an equal dose sufficient to produce local anesthesia, the new drug is much less toxic than cocain, and has a very slight action on the vital functions of the economy.
2. It produces a local anesthesia more rapid and more pronounced than cocain, and of at least as great a duration.
3. The solution of the salt being an antiseptic, as was pointed out by Chadbourne, can be kept for several months without decomposition, while after a few days a cocain solution is worthless for injections.

MASTICATION IN MAN.

BY HANS BLOCK, DRESDEN, GERMANY.

MASTICATION IN GENERAL.

"THE final object of every scientific inquiry," says Buckle, "is the power of foretelling the future," and when students of dental surgery have fully investigated the relations of mastication, one important result must be that they will be better acquainted with the necessary consequences which any operative procedures must have; that is, they will better understand how to render surgical services to their patients with a view to improving mastication; they can more accurately foretell the future results in every case, and will be able to better meet the requirements of their patients.

The Latin word *masticare* means to chew, to divide, to grind, to comminute, to crush, to reduce, to triturate, to break up; hence the English word "mastication."

Let us first consider what relation mastication has to the external world.

The word mastication is a comprehensive term. It not only tells us that we are dealing with biology, and that we are in the midst of the organic or living world, but it refers us directly to the animal kingdom, as it denominates a process belonging exclusively to animal life (although not all animals, not even all mammalia, do masticate). There are a hundred thousand living species of animals on our globe, and if we had to study all the forms of apparatus which they have for mastication, it would exceed a lifetime study.

When we investigate mastication, we take leave of the vegetable world, for plants, which are destitute of the endowment of sensibility, consciousness, volition and voluntary action, and of motion, are naturally not capable of mastication, nor do they require any masticatory organs, nor any internal cavity to contain their food and reduce it to a fluid state, for their nutrition goes on by direct absorption through their tegumentary system. The human teeth, which are also provided with their aliment solely through their roots, resemble in this respect vegetable structures.

Mastication is inseparable from an extremely reckless struggle which we never can impute to plants; it means destruction of living structures for the sake of building up other living animal structures, and is often the instigator of cruelty and of suffering.

We must indeed not overlook that in all beings who are capable of mastication the introduction of food is under the control of their will; that in them the desire for food can become extremely painful; and that these beings can stop their nourishment voluntarily, and in that way commit suicide. This is impossible for plants, as they cannot exercise any voluntary power. Justly it may be asked if this prerogative is a preference, an advantage for the animal kingdom of which man is the head. The human race is indeed especially exposed to the hardest struggles in the demand for food. Those who in vain are looking for its supply, in spite of all efforts of their will, are exposed to starvation, and in this way mastication is closely related to the social question.

As soon as we contend that *in everything in nature there is order*

and design, which would prove the necessity for an intelligent and omnipotent Creator, we must concede that there must exist some constitutional laws regarding the character of the food of man, and everybody ought to be interested in finding and learning these laws. Dentists, however, do not seem to care to take the time or trouble for studying this question. But it is a too important one to permit of any further slighting, for we shall see that it is a neglect of duty when dentists ignore the science of human life, an important part of which is intrusted to their care.

As every species of the animal kingdom has its own and unchangeable range of food, to which its masticatory and digestive apparatus is adapted, it is obvious that deviation from this proper range of alimentary substances regularly results in degeneration, or at least in debility and disease, which are incompatible with longevity.

Now, as a fact, animals never live contrary to the laws of nature, but men do, and hence disease is nearly unknown among animals as long as they live in a free state of nature where they can follow their own instincts; but among the human race disease has a strong foothold, and interferes with the highest development and increase of man.

"Man is," says Dr. Rodrigues Ottolengui in his invaluable work on "Methods of Filling Teeth," "the only animal who constantly suffers from caries"; but his conclusion is erroneous, that this is so because the human race is more susceptible to it. In reality, man breeds caries by his reckless contravention of all hygienic laws.

It ought to be expected that naturalists, anatomists, and physiologists should in the first line have devoted all their lifetime to the solution of the one question, What kind of food has been designed for man to answer the highest interests of his constitution?

It is of course known to everybody that "food is anything that, introduced in the alimentary canal, can meet the constitutional wants of the body," and in this way even a bottle of kerosene may temporarily serve as food to a miner entombed alive under the earth; but food in this general sense is not fitted for every-day use, as the natural food is only that kind which affords the greatest extent of longevity.

The definition given by some physiologists, that "food is any substance capable of playing a part in the nutrition of the body," is not concise enough, for sodium chlorid is not food, although salt "plays a part," etc.; nor is a purgative food, nor the saliva, nor is a set of artificial teeth or a silver spoon food, although they all "are capable of playing a part in the nutrition of the body."

To say it exactly would be: "Food is any substance containing nutritive materials capable of forming proximate (or alimentary) principles in a digestible state."

Furthermore, some physiologists say, "The nutritive value of the food depends upon the extent to which the alimentary principles exist in it." This could mean that the more alimentary principles the food contains, the higher would be its nutritive value. Such an apprehension would, however, involve tremendous error, as the real nutritive value of the food depends upon its digestibility; that means upon the presence of a certain amount of nutritive materials, the character and extent of which are wonderfully regulated by nature, and cannot as yet be imitated, perhaps never will.

It is not the concentrated food that man has to hunt for, but it is the normal and natural food which alone gives him the right proportion of nutritious and innutritious matter.

But, strange to say, although the question regarding the natural diet of man is the one which is of pre-eminent importance for the health of the human race, it has yet been unsatisfactorily investigated by nearly all scientific experts, and although hygiene could be a matter of nearly as exact science as mathematics, it is yet, as far as diet is concerned, at present shrouded in mystery. In consequence of this misapprehension, one-third of all human beings die during childhood, and an immense amount of human happiness is destroyed on account of the imperfect understanding of the real laws of hygiene, and especially that of nutrition.

Anthropologists profess that there is no doubt that primitive men indulged in cannibalism, but what testimony they have to prove this seems to be a secret, even devoid of any sound psychological basis.

That man is not exclusively herbivorous, nor graminivorous, nor carnivorous, like other mammalia, is now generally conceded by everybody.

The question is not, however, settled, whether man is a frugivor or an omnivor. Conclusions to this effect have been made by celebrated physiologists and anatomists which are inconsistent with incontestable physiological maxims and inconsistent with the higher principles of reasoning. And yet these suppositions are generally unquestionably accepted by modern men of science. All colleges and universities (except that at St. Petersburg, Russia) teach nowadays straight from the shoulder, that man is an omnivor. The dental periodicals only too often thoughtlessly re-echo this.

So many opposing arguments, however, are in favor of those who affirm the frugivorian character of man, that the authoritative doctrine, "Man is an omnivor," has never been able to stand the fire of discussion.

The idea that man is a frugivor, and must live exclusively on fruits or atone for it, was originally advanced by the founders of the oldest religions, who all were eminent philosophers; later on by Pythagoras, who lived twenty-four centuries ago, it was worked out in a metaphysical system. Since then this view has been partly or fully indorsed by nearly all prominent thinkers, among them by Newton and Shakespeare, and at present the idea lives, and sooner or later must inevitably result in a reform of dietetic science.

The process of mastication is a part of the phenomena involved in the study of the natural dietetic character of man, for the organs of mastication, or at least the teeth, are of such typical forms that they afford one of the most essential means of distinction between species of different dietetic characters.

Moreover, between the organs of movement and those of mastication is established a fixed relation; for instance, the ruminants always have hoofs, the beasts of prey have toes which are not grown together but are pointed to claws, and so on. Furthermore, the articulation of the jaw differs, and for example in carnivorous animals all lateral motion of the lower jaw, in the act of mastication, is not only precluded by the saw-like structure of the teeth and the shutting of the lower within the upper, but it is rendered impossible by the hinge-

like joint of the maxillæ, which only permits of ginglymus motion, whereas herbivorous animals have the freest lateral motion in mastication.

Hence for the same reasons the levator muscles of the jaw are large and powerful in carnivores, but small in herbivores, which, on the other hand, have the pterygoid muscles (for lateral movement) largely developed.

Professor Henry Gray, who is very laconic in his treatment of comparative anatomy, only states that in *carnivora* the zygomatic process is very strong, and projects enormously, while the clavicle is merely rudimentary. This is meager information for a modern text book; and so much the more so because better and more complete comparisons were made in this direction thousands of years ago.

Notwithstanding the admiration which we incontestably all owe to the more modern discoverers in biology, Linné, Bichat, Buffon, Cuvier, Owen, Hunter, etc., it is conspicuous that while these men of such refined gift of observation were studying the dietetic character of man, their work was not so thorough as that of men who lived two millenniums before them. That this was not due to their lack of qualification, but to want of sufficient care, is obvious. We find that Plutarch, although he lived eighteen hundred years ago, and was no naturalist, points out some remarkable relations between *carnivora* and man, which by those modern specialists who have enriched comparative anatomy so greatly with other details were partly overlooked.

Plutarch says, "Carnivores have a higher digestive power and a higher blood-temperature than men have, and the roundness of the human teeth, the smallness of the mouth, and the softness of the tongue prove sufficiently that nature has not destined us for carnivores." Some of these criteria have been overlooked by modern biologists, though it would be very desirable to have complete statistical comparisons on the measurement proposed by Plutarch to evince the correctness of his theory. But instead of making investigations in this direction, we find that the dental periodicals, faithful to the general sterile narrowness of view now in style with all specialists who believe they can attempt scientific progress without a previous study of metaphysics, philosophy, and cultural history, are filled with the most minute illustrations of the deplorable advances of degeneration in modern cities, and they do this without seizing the problem: What is this degeneration due to, and how can we arrest it?

It might be objected that Plutarch was mistaken, and that the tongue had nothing to do with mastication. But it ought to be considered that the tongue is such a powerful muscle, or rather complexus of muscles, that it is used constantly in the act of eating, not only to push the morsels on the morsal surfaces, but also by many old people who have lost all their teeth and yet crush their food into soft little pieces by the pressure of the tongue. Plutarch's observation that in *carnivores* the tongue is coarse like a grater was therefore a useful one, and, thanks to the immortality of thought, we can derive benefit from it even now after eighteen centuries.

The economy of nutrition sustains the whole body, and its tissues are all elaborated and built up solely from the blood, which is derived from the food. The proper food must necessarily produce healthy blood, and so it is evident that incorrect diet is the main source of dis-

case. A thorough scientific study of the comparative anatomy of the organs of mastication, and a clear elucidation of all the other points integrating the natural dietetic character of man, would therefore be of far greater benefit for the human welfare than thousands of those modern disclosures of problematic value, which are more exhausting than exhaustive.

As strictly belonging to the dentist's area, one little example may, however, be inserted here to show what absurdities can result from lack of acquaintance with those fundamental laws (and especially with fundamental hygienic laws) which have to be our guide in all our inquiries.

Modern evolutionists have advanced the theory, or "discovery" as they call it, that man will eventually lose his wisdom-teeth and his laterals, in total eight teeth, or the trifle of twenty-five per cent. out of his present set of thirty-two.

This statement is, however, incompatible with fundamental principles, and therefore incorrect.

Evolutionists base their statement on the fact that those inhabitants of large cities who mostly live on substances which hardly require any trituration—for instance, on bread made of finely divided flour and prepared with those malicious substances called baking-powder and artificial yeast—do not sufficiently use their teeth and exercise their jaws, and consequently bring about an arrest of development of their jaws and teeth. Is anything more natural than this result, which simply teaches us the old, old story, that organs which are insufficiently used must degenerate? Or has it not been known to everybody since the establishment of the Olympian games by the Greek athletes, twenty-seven centuries ago, that *the normal use of all organs is necessary to their health*, and that exercise increases their development? Does a sitting occupation, with lack of outdoor exercise, not weaken the lower extremities and the lungs? What, then, after all, is the philosophy of this "discovery"? Simply that we ought to return to our natural aliment—for instance, a coarser unbolted bread as prepared by the country people of Europe—and discard all other abnormal stomach pleasures, especially intoxicating beverages. The wisdom-teeth and laterals are not deficient in the jaws of any nation that has happy dietetic habits, but only in those individuals who live in a poor (physiologically poor) style.

It would be easy to demonstrate within a few decenniums the loss of function or of development of any organ by lack of exercise, but has that anything to do with the evolution of man? Most positively not. We should be stimulated to care for a better education of the masses, that they may never forget the maxim that harmonious development and health of all organs depend upon their steady use. That is all, and everybody who observes the causes of monstrosities will understand that.

It is indeed true, that as the eyes are the mirror of the soul, just so are the teeth the mirror of the body (or of its health), and from the reports of the dentists upon the decay or the irregularity of the teeth we can easily conclude what the morals and the physical and mental conditions of a country may be like.

Those people in whom the wisdom-teeth remain suppressed are positively not types of health nor of morality; they are rather outcasts of a sick population which mostly needs one thing, and that is:

a return to nature in their dietetic habits. In fact, it would be good for many of those enfeebled people if they would get an equivalent of twenty years of service in the French, or Austrian, or German army. This would, to a very great part, dispel their mischievous customs and correct their improper diet, and all the absent teeth would wonderfully develop in them.

Emerson is very right in saying, "In the constructions of nature no particle can be dispensed with." This is indeed one of the most comprehensive laws ever proclaimed to the world. The theory of the disappearing of the wisdom-teeth is arrived at by the inductive method of thinking; it is a generalization of an incorrect or inexact observation. Emerson's law, however, is obtained by the deductive method of reasoning, and as it is shared by all philosophers, who pronounced it in a thousand different ways, the test of time has proved it as a truth. It takes little meditation to detect that the hypothesis of the suppression of teeth is incompatible with this truth, and so it has to give way.

Another law of deductive origin is that of Graham, who writes: "Man has no power to abolish the laws of nature, but must obey them or suffer," and we would add that all those who lived in such a manner that their wisdom or lateral teeth did not develop in their jaws have no reason at all to be proud of it (for every deficiency is a disgrace), and to consider themselves as "improved" specimens of the human family, for they belong just to the opposite side, where depravity and degeneration have reserved front seats for them.

Or let any number of persons of ordinary habits of living accustom themselves to masticate their food freely on one side, for instance, the right side of their mouth only, and make no use of their teeth on the other side, and in a few generations their offspring will indubitably all be deficient of the teeth on their left side, and evolutionists could seize the result and declare that mankind is losing all the teeth on the left side. This prophetic announcement would really contain the same amount of wisdom as the theory concerning the disappearance of the wisdom-teeth in the human race.

Where are the proofs that these teeth begin to disappear in otherwise *perfectly* healthy people? Where are the proofs that adult people with only twenty-four or twenty-eight teeth developed in their jaws are not weaklings, that they are not deficient in all other respects of physical development too? Where are the statistics supporting these observations?

Let us give the right answer. These proofs do not exist, as the whole "discovery" is only an unjustifiable generalization of some abnormalities which were the consequence of disturbed health or perverted habits; and just as syphilitic patients exhibit organic deficiencies, so do other degenerated people exhibit dental deficiencies. Those who wish to know why not the arms or the eyes, but just the wisdom-teeth, are absent as a result of degeneration, may consider that there are no other organs in the whole skeleton whose growth could be interfered with after childhood, but the wisdom-teeth because they alone develop so late.

Again, other authors make the remark that the wisdom-teeth are of little use for man any more. This is likewise an unqualified and hasty hypothesis, contrary to all common sense.

Dr. I. B. Davenport recently said, "The fight for existence is such a close one that slight advantages determine the result."

Now, is it not an advantage to have four teeth more for the work of mastication? and as such an advantage may perhaps determine in the result of enabling us to live longer, how can these teeth be called "useless," even if their existence would prolong our life only by four weeks or four days?

Are the wisdom-teeth not placed nearest to the masticating muscles, and consequently in the *best* position for powerful action? Do they not act at the fulcrum? Are these not the largest teeth, as a rule, and are they not imbedded in much thicker bony surroundings than any other tooth? We can safely answer: The four wisdom-teeth are just as indispensable for everybody nowadays as they were two thousand or five thousand years ago. If statistics were taken from observations of one of the European armies with respect to the condition and utility of the wisdom-teeth, they would be most valuable, as such a field would be the best in the world to examine the entire adult population which is able-bodied, and consequently healthy, and all private notes based only on few cases would shrink into insignificance when compared with those results. Dentists should also, for other reasons, make efforts for securing dental statistics in the European armies.

The whole confusion arises from the mistake on the part of observers in failing to consider that in all cases where there is a deficiency in the number of teeth a depraved hygienic regimen will account for it, and that in our days relatively more persons are effeminate because they make a wrong use of the comforts and a too extensive use of the evils of civilization. Departure from hygienic laws leads to monstrosities and anomalies.

Nature, when undisturbed by human ignorance, always produces perfect creatures, always men with thirty-two teeth, and evils only are derived from a violation of the laws of life and health.

Pathological and degenerative changes have nothing to do with evolution. Evolution is a change brought about under the influence of geological revolutions from which not one individual of the species can escape; but pathological changes are entirely restricted to the single individual and to his personal regimen.

As man anatomically now is, so has he been as far back as the first traces of myth permit of the conception, and so will he remain.

In the hypothesis of the evolutionists, that the wisdom and lateral teeth are rapidly disappearing, the wish, we may say, has been father to the thought.

THE MUSCLES OF MASTICATION.

After these introductory comments on the bearing which mastication has to the scientific study of man, we are prepared to enter into the subject proper of our theme.

The muscles of mastication belong to the voluntary groups which by their striped appearance show that they act under the control of the will, which is exercised by the brain. These muscles are purely organs of external relation, or, as it is termed, of animal life, which always requires voluntary motion, whereas the organs of organic life have really no time to wait for any voluntary suggestions, as a single moment's entire suspension of the functions of organic life would be

a death from which there could be no resuscitation. The grand aim in the vital economy for which all its organs co-operate is, however, not death, but the sustenance of the body, and in the words of the unhappy crown-prince Rudolf, of Austria, "the life of man is the most valuable capital" in the world.

We need not follow up the development of these muscles from their first appearance in the seventh week of fetal life. What interests us is that the tissue of which these muscles are composed has two important vital properties: it is contractile and susceptible of stimuli, and as soon as vitality ceases in the muscles no power on earth can give back to them their vital properties. The stimuli or irritations to which these voluntary muscles are subjected are nervous impulses which are generated in the center of animal life (at or near the top of the medulla oblongata, though the apparent origin of the roots of the nerves is perceptible, somewhat remote from this point), and they are transmitted through special nerves which convey only efferent or centrifugal powers, and are called motor nerves. These nerves, which might be called the instruments of vitality, belong to the cerebro-spinal system, and are composed of medullated nerve-fibers. A single one of these nerve-fibers always enters a single muscular fiber, at points which are called motorial end-plates.

When stimuli affect these end-plates, then in the same instant the muscles respond by their contraction (the amount and energy of which is regulated by the will), and it is only by this action of the muscles (in this case the voluntary muscles) that motions are performed, motions which are necessary for the supply of the internal wants of the organism. Hence we can often conclude from the motions of an organism what are its natural conditions of living. These motions, like almost every function of animal bodies, are performed in opposition to the law of gravity.

To sustain their vital properties all muscles and nerves are nourished by the blood-vessels over whose functions the nerves of organic life preside, which have their centers in the semilunar ganglia and solar plexus. This arrangement makes it evident that animal life and all our great endowments, as sensibility, consciousness of being, etc., which give us our interesting faculties and peculiarities, are dependent upon the center of organic life, which stands in the most intimate sympathy with the stomach. Here, then, again, is a proof that by neglect of natural dietetic rules our highest intellectual endowments must suffer.

As we perceive, the object of the muscles is the exertion of force, which has to be transformed into work. But it might be asked, How is this force generated? This is very plain. All living animal bodies, by virtue of their vitality, generate heat. This heat is derived from the oxidation of the food taken up into the system and partly transmuted into muscular energy. It is, however, not the destruction of the albuminous principles from which the heat results, but it is the oxidation of the saccharine and oleaginous principles from which the evolution of muscular force originates.

In the case of the masticating muscles, as we shall see, this force is transmitted to the jaws which support the teeth, and the mechanical work of mastication consists in the breaking up of the food while it is in contact with the morsal planes of the teeth.

The lower jaw is the only bony part of the skull which is movable, and it is by the muscles of mastication that this movement is brought about. They are only called muscles of mastication, though they are used to a great extent also for voice and speech.

Of the four hundred and seventy or five hundred muscles which hold the human frame together, the muscles of mastication form only a very small part, and each of them has an origin (attachment to the fixed part) and an insertion (termination at the movable part).

The muscles of mastication, like all parts of the body belonging to animal life, are of a duplicate form, for there is on one side of the median line a right, and on the other a left half, which are almost precisely alike, although in the domain of organic life there is rarely perfect symmetrical correspondence of the two halves.

Professor Henry Gray informs us, on page 301 of his "Anatomy," that the articulation of the lower jaw is one of the joints of the trunk; but this is, of course, a blunder, as the jaw belongs to the skull, and not to the trunk. On page 365 he calls the muscles of mastication "muscles of the face" instead of the skull. He furthermore enumerates the temporo-maxillary articulation under the group arthrodia. This is right in as far as every movable joint must permit of gliding motion; as soon, however, as we discriminate the various directions of motion which the joint permits, we can no longer place the lower jaw in such a monotonous class as arthrodia, but must properly call its articulation condyloid diarthrosis, because in man the jaw articulates by an ovoid head in an elliptical cavity which permits of all movements except circular rotation.

The principal muscles of mastication are the temporal, the masseter, the buccinator, and the internal and external pterygoid muscles, and we shall confine our study to them; but, strictly speaking, all muscles which help to move the bolus within the mouth and all which depress the jaw ought to be included in this group; that is, we have to add the digastric, the platysma-myoides, the mylo-hyoid, the orbicularis oris, and the five muscles of the tongue.

That the latter are just as necessary in mastication as in voice and speech, is proven by the fact that many animals have a very large tongue without using it for voice. "In the snail twelve thousand to forty thousand teeth have been counted on the saw-like lingual ribbon," and even in some classes of mammals teeth may be found upon the tongue. Now when in this case the tongue itself represents the entire masticatory apparatus, why shall we not in general give to the tongue at least the honor of ranging it among the muscles of mastication?

In studying the individual muscles, let us begin with the buccinator or cheek muscle, as it is that muscle which in the first stage of infancy is exclusively used in mastication, whence it also is called the sucking muscle. Really, the whole face of the infant seems to be one buccinator. It is a quadrilateral muscle. Its fibers bulge out on the cheeks, and converge to the angle of the mouth and the lips. Its name is derived from the Latin word *buccinum*, a trumpet, because it is brought into full use and visible action in blowing that instrument.

The buccinator arises:

1. From a ridge on the outside of the alveolus of the superior maxilla covering the three molars, which ridge Gray has failed to

point out, though on all other bones he marks every point, be it even of the size of a pin's head. This ridge is called by Dr. G. V. Black the molar ridge or molar eminence.

2. From the front part of the pterygo-maxillary ligament, which forms a part of the inner walls of the mouth.

The buccinator is inserted in the outer part of the alveolus of the inferior maxilla (inferior molar ridge), corresponding to the origin above, and into the orbicularis oris.

Its action is to compress the cheeks.

The masseter is likewise a quadrilateral muscle, and does, as its name indicates, the main work in masticating. It arises by two heads :

1. An outer or superficial one which is attached to the malar process of the superior maxilla and the zygomatic arch (malar bone), and is inserted into the angle of the lower jaw and the lower half of the ramus on its outside.

2. The inner or deep portion of the masseter takes its origin from the inner part of the zygomatic arch, and terminates in the upper half of the ramus and the outer side of the coronoid process.

The action of the masseter is to raise the jaw up and forward.

The temporal is a broad, radiating muscle, whose fibers converge toward a point ; it is by this arrangement somewhat in shape like a fan. Its name is derived from the Latin word *tempus*, time, whereby the temples shall be remembered as the place where the appearance of gray hair first indicates the progress of age and time.

The temporal muscle arises from :

1. The inner surface of the temporal fascia.

2. The temporal fossa.

3. The inferior temporal ridge. As the *full* extent of this ridge is nowhere mentioned in Gray's "Anatomy," it may be well to state here that it begins at the external angular process of the frontal bone, from where it runs along the curved lines on the frontal and parietal bones to the posterior root of the zygomatic process of the temporal bone. The curve described by the superior temporal ridge which gives attachment to the temporal fascia is a little larger.

The temporal muscle is inserted into the inner part of the coronoid process of the lower jaw.

The action of the temporal is to raise the jaw up and backward. In this way it brings the incisors together, and may hence be called the biting muscle proper.

The internal pterygoid is again a quadrilateral muscle like the masseter, to which it runs nearly parallel and to which it is a synergist, as it also raises the jaw up and forward. It takes its origin :

1. From the inner surface of the external plate of the pterygoid process of the sphenoid bone.

2. From the posterior tuberosity of the vertical plate of the palate bone.

3. From the tuberosity of the superior maxilla, which prosthetic dentists like to call "the condyle," or the "heel" of the jaw.

The internal pterygoid muscle is inserted into the inner side of the angle and ramus of the lower jaw.

The external pterygoid muscle is decidedly the most interesting and characteristic muscle of the whole group, as it runs nearly horizontally and is inserted into an interarticular fibro-cartilage, a case

without parallel in the whole skeleton. It is somewhat conical, pyramidal, or V-shaped in outline, and originates by two heads, an upper and lower one, and is attached to the pterygoid ridge of the great wing of the sphenoid bone and the outer surface of its external plate, to be inserted into the neck of the condyle of the lower jaw and its interarticular fibro-cartilage.

When this muscle acts on one side only, then it draws the jaw forward and laterally to the opposite side; when it acts, however, simultaneously with its fellow, then the jaw is simply drawn forward. In this way it produces the rotary motion which is so marked in herbivora, and which stamps it as the real triturating or grinding muscle.

The external pterygoids are opposed by the digastric and hyoid muscles.

For the dentist the pterygoid is often the source of annoying difficulty, for through its action in the procedure of "taking the bite" patients will often throw their jaw forward or sideways, and all efforts to get the correct "bite" are in vain.

To tell the patient to "bite with the back teeth" or "as in swallowing," or while placing the finger on the tip of the upper front teeth to tell the patient "not to bite the finger, but back of it," or to order him to "throw the head backward" (so as to make the throat muscles act as a bridle), or to "place the tongue on the roof of his mouth and to keep it there while closing," are often of no avail, for as soon as the patient hears the word "bite," he will bring his lower jaw in a hostile position like a carnivore.

The only remedy is, after directing the patient to open his mouth, to place the thumb on his symphysis and the other four fingers on the ligamentum nuchæ, and while the jaw in this way is firmly pressed backward by the operator, he must be told to "close his mouth" (not to "bite"). This is the way to get the correct bite, or, as it should be called, the occlusion, or articulation, or interarticulation.

Besides, by the power of the muscles the lower jaw is held in position by four (or as some say five) ligaments, of which only two have any strength. These are the external and internal lateral ligaments.

The strength of the levators of the jaw is in some acrobats five hundred pounds, and in many sound persons so great that they can crack a peach-stone, which act requires a pressure of probably three hundred pounds.

The depressor muscles of the jaw (the digastric, glenio-hyoid, mylo-hyoid, and platysma-myoides) have a dynamic power of four pounds.

The involuntary tendency of the jaw to drop equals one pound only.

As we see, those muscles which keep the mouth closed are far more powerful than their antagonists, and it is only natural that patients in a dentist's chair very soon get tired of keeping the mouth open.

When by the loss of teeth the masticating muscles shorten somewhat, they will lengthen again, and give to the patient a better appearance, as soon as an artificial appliance brings the jaws back to their natural distance.

Regarding the innervation of the muscles of mastication, we find that they are all supplied by the inferior maxillary division of the fifth nerve, which also is called the trifacial or trigeminus, and belongs to

the group known as the cranial nerves. Although this nerve is as to its greater part a nerve of common sensation, its smaller (anterior) root is a motor branch, and has its superficial origin from the side of the pons Varolii. The trifacial is sometimes also called the "sympathetic of the head," and it is really capable of an exorbitant degree of morbid sympathy between the different parts of its distribution. It communicates with the organs of all the five senses. By some this nerve (together with the Gasserian ganglion) is thought to be the peculiar cerebral organ of animal instinct; this may be possible when we consider that the gustatory or lingual branch of this nerve is presumed to be the nerve of taste.

Although the buccinator receives branches from the inferior maxillary nerve, it is yet asserted that these branches in the buccinator are entirely nerves of ordinary sensation, and that the true motor supply of the buccinator is from buccal branches of the facial or seventh pair of nerves.

As to the vascular supply of the muscles of mastication, it would be somewhat toilsome to follow all the tortuosities and twistings in the course of those vessels which supply them with arterial blood and carry the venous blood away; we must therefore confine their description to the mere statement of their names. We shall see that these muscles derive all their nourishment from the external carotid artery, and mainly from its two terminations, which are called the internal maxillary and the temporal artery.

The buccinator is supplied by the buccal branch, the masseter by the masseteric, the temporal by the deep temporal, and the internal and external pterygoids by the pterygoid branch of the internal maxillary artery, which is the larger termination of the external carotid artery.

The buccinator, internal pterygoid, and masseter are besides supplied by the muscular branch of the facial artery, and the temporal by the posterior temporal artery; that is, by its transverse facial branch and by the middle temporal artery.

The return of the blood to the heart is effected by means of the branches of the external and internal jugular veins.

OCCUSION.

Furnished with the knowledge which we now have of the muscles, their name, origin, insertion, relation to nerves and blood-vessels, and their action, we are prepared to study the act of mastication, which is somewhat complicated.

Before, however, the dynamical relations can be clearly elucidated, it is proper to investigate first the statical relations, that is, the stage of occlusion, just as an engineer will study a machine first while it is at rest, before at work.

Occlusion is the correct articulation of the teeth of both jaws while the mouth is closed, and the condyles of the jaw in the glenoid cavity are as far back as possible. The jaws rest on each other in occlusion. No light enters the mouth during occlusion, and the teeth are shrouded in nearly perfect darkness, as the cheeks and the bones of the face are only very slightly translucent.

Gray, whose "Anatomy" once marked such a progress in descrip-

tion, left the rules of occlusion entirely untouched, so that dentists have to some extent worked out this part of anatomy for themselves, although the work is far from complete.

We shall now endeavor to describe the normal human denture, which, as Dr. Dean recently said, means the perfect, excellent, ideal denture.

Against this might be objected that normal dentures will never or so rarely occur in real life, that their description would be a mere phantom and of no value.

To this objection we reply that perfect symmetry, although a little rarer in the vital domain than in the inorganic world, is the common and inseparable companion of health. Health, of course, is a rare condition among our pampered metropolitans, but it is not rare among the lower classes (whose occupation compels them to exercise and to simplicity in diet), and even less rare among the rural classes; nor is it rare among savage tribes, where health and splendid dentures are to be found abundantly; nor is it rare among the lower classes of animals, which by authority of their pure instinct can never violate the laws of nature.

Those who generalize their observations made on their metropolitan clients maintain that nature does not make all things perfect, and hence that nature is to be—not imitated, but surpassed. Those who so speak forget that *it is the highest degree of perfectness to be invariably consequent on a wise plan*. Nature gives perfect dentures to all who live in conformity with her laws.

A high authority said last year, "The first permanent molars are the only teeth that erupt normally, and are not influenced by the other teeth. On the other hand, the third molars seldom erupt normally." This remark would perhaps be limited a little should its author be asked if he personally inspected the mouths of all the fifteen hundred millions of men who populate the earth, or if he had any statistical records of equivalent value on hand.

As we have mentioned, the rural classes are as a rule healthy (mortality is found to be three times greater in the city than in the country), and they form by far the greater part of the population of all nations, and hence we can say the majority of the human race is healthy, and consequently in possession of normal dentures.

The great average of human dentures must necessarily be normal and symmetrical, and we need not be afraid to establish the rules which appertain to and govern the normal arrangement and articulation of the teeth, because its existence is not a mere fancy, but a common occurrence.

It may be arbitrary for a dentist who has to make an artificial denture, if he wants to follow the anatomical rules, or if he prefers to imitate nature by way of representing abnormities and irregularities, but there can be no doubt that normality is superior to all deviations from the ideal. Besides, the representation of abnormities requires just as well the previous knowledge of normality.

It is also true that perfect dentures can be made by artists and experts without any knowledge of rules, and without any other fixed guide but refined, instinctive perception. "Art founded on empiricism can, however, never equal in accuracy that founded upon science," and we have here hardly to deal with the opinions about artificial den-

tures, but with the anatomy of the natural human denture, without the knowledge of which we should fail to understand mastication.

About the nomenclature which we have to use no divergence exists, as the popular and the scientific names of the teeth are identical in America. It is true the majority would perhaps prefer Dr. Palmer's dental notation, which divides the mouth into four divisions and describes the teeth by numbers from one to eight, and their position by an angle-mark indicating the relation to median and occluding line (for instance, right upper central 1 | or lower left third molar | 8), but we have to wait for the general authoritative indorsement of this or some better system, perhaps by the World's Columbian Dental Congress. Soon, however, the individual teeth will have to be named by figures,—thus securing a truly international denomination. Then the various surfaces of the teeth ought to be baptized in the same way, viz: mesial side should be side I; distal side, side II; labial or buccal side, side III; lingual or palatal side, side IV; neck, side V; morsal surface, side VI. This notation would unite the advantage of international intelligibility with that of greatest simplicity; a compound cavity, for instance, which combines the mesial, buccal and morsal surfaces of a tooth could be described by the short method of Roman figures with I-, II-, VI-sided cavity.

THE SIXTH-YEAR MOLAR.

Though the present nomenclature is just as logical as simple, there is yet one name given to one of the eight types of teeth which ought, once for ever, to be removed from all scientific papers, periodicals, colleges, and text-books, and ought never to be used any more by learned dentists neither in America nor in Great Britain nor in France (the other countries are free from it), and that is the name "sixth-year molar" given to the first permanent tooth.

One would watch in vain for a sixth-year molar of any perfectly and well developed child of undegenerated origin. No molar would make its appearance, no permanent molar would be discoverable at that age. All periodicals, in nearly every copy, publish the utterance of some eminent practitioner to the effect that "Americans have the poorest teeth in the world." As "poor" teeth erupt prematurely as a rule, and as dentists mostly make their observations in large cities on rich patients who give a very "poor" average, we may guess how the unnatural name originated in the American nomenclature fixing a standard which is entirely incorrect. Harris carries this undesirable premature eruption in rich American children to startling extremes, as he writes, on page 187 (unconscious of what a confession it involves),—

"The average time for the eruption of the first permanent molars is five to six years."

The logical deduction from this might be expressed as follows:

And the average mortality of people with fifth- or sixth-year molars is one-seventh greater than the normal average.

That under no circumstances should second dentition normally commence before the beginning of the seventh year can be learned from all European, and especially the older, authorities. We must be contented with the quotation of only a few of them.

Gray, on page 850, writes, "The first permanent molars appear at six and a half years;" that is, within the seventh year.

Graham writes, "The process of second dentition ordinarily commences about the seventh year of life."

Dr. Jul. Parreidt, in his book on "The Teeth," remarks, "The first molar erupts in the seventh year. It wants six years for its development, when only its crown and a quarter of its root are ready."

Dr. M. Eichler, in the newest German compend of dentistry (which is partly under the press yet), writes, "The first molars appear at the end of the sixth or at the beginning of the seventh year in the upper jaw, and later on in the lower."

That the abnormal premature eruption of the first molar is such a frequent occurrence can only prove that many city children are abnormally brought up; but when teeth erupt early their structure is not well nourished, and all sensible parents ought to improve the hygiene of their children when they see from the premature dentition that the child's vital power and its health are put at an undesirable stretch. Moreover, we know that in case of abscess from death of the pulp of a deciduous tooth, the permanent tooth erupts earlier than nature intended.

The name "sixth-year molar" is a pathological name, and if we take the earliest dentition of frequent occurrence on record, we ought to call the first molar "fifth-year molar." If we, however, desire to indicate the normal period of its eruption, then we are forced to give it the name "seventh-year molar." This name is too long for popular use, but the old wrong name, "sixth-year molar," ought to be promptly discarded, for it has no sense under the heaven, as the tooth does not normally erupt in the sixth year.

The error recalls a little table about "the sevens of eruption," which, being not bare of interest, might be inserted here, as it has never been published before, and embraces really all the "turning-points" of dentition:

SEVENS IN THE ORDER OF DENTAL ERUPTION.

<i>Before Birth.</i>	TIME OF APPEARANCE.
The primitive dental groove, containing germs of deciduous teeth, in the	7th foetal week.
Completion of epithelial follicles of future enamel-organ of deciduous teeth and formation of dental sac, at	2 times 7 foetal weeks.
Beginning of calcification of germs of deciduous teeth, appearance of germs of permanent teeth, at	3 times 7 foetal weeks.
Appearance of enamel in remaining temporary teeth (cuspids and molars), about	7th foetal month.
<i>After Birth.</i>	
Completion of calcification of deciduous teeth, at	3 times 7 weeks.
Eruption of lower centrals (first deciduous teeth), formation of second permanent molar, at	7th month.
Eruption of first deciduous molar, at	2 times 7 months.
Eruption of second milk-molars (last deciduous teeth), formation of third permanent molar, at	3 times 7 to 5 times 7 months.
Eruption of first permanent molar, beginning of calcification of second molar, at	7 years.
Eruption of second permanent molar, beginning of calcification of third molar, at	2 times 7 years.
Eruption of third permanent molar, at	3 times 7 years.

Also the name "wisdom-tooth" is objectionable as having no scien-

tific meaning, though it must be acknowledged that the whole temperament character of everybody undergoes a remarkable change toward "wisdom" at the age of about twenty-one years, which in all countries is regarded as the time of majority or full age. The full denture in this way became correlated with the "full wisdom."

(To be continued.)

SODIUM PEROXID (Na_2O_2), A NEW DENTAL BLEACHING AGENT AND ANTISEPTIC.

BY EDWARD C. KIRK, D.D.S., PHILADELPHIA, PA.

(Read before the Second District Dental Society of the State of New York, February 13, 1893.)

AN investigation of any substance to be applied for the purpose of bleaching discolored teeth must include a recognition of the nature of the pigmentary material contained in the dentinal tubuli, with somewhat of an understanding of its chemical composition and relationships; for as in general the process of bleaching is a chemical process, a knowledge of the factors entering into the reactions involved becomes of first importance in deciding what method or material to use, and the limitations which may determine the success of its application. All true bleaching processes are essentially chemical reactions between the ultimate constituents of the bleaching agent on the one hand, and those of the color compound on the other, the resulting by-products being either colorless or removable by solution. Or, to state the case somewhat differently, I quote the following definition from a paper which I read before the First District Dental Society of New York in February, 1889:

"Bleaching in general may be defined as a chemical reaction between a compound having color, and some substance capable of affecting its composition in such a manner that the color is discharged, or, in other words, of so affecting the integrity of the molecule of the coloring-matter as to destroy its identity, which necessarily results in a loss of its distinguishing physical characteristic,—viz, its color."

The mass of detritus resulting from pulp-decomposition and fermenting organic matter which gives rise to the discoloration of tooth-structure is undoubtedly of extremely complex chemical composition and constantly undergoing changes, if we consider it as an aggregation of organic proximate principles; but viewed from the standpoint of its ultimate composition, we are, I think, justified in regarding it as organic and composed wholly of those elements which ordinarily enter into the composition of organic compounds. There are, besides these, probably always present in the decomposing contents of the pulp-canals and tubuli, sulfur compounds from the decomposition of albuminous matters, with the addition of certain fatty or oily substances resulting from food-particles and their decomposition. Both of these kinds of materials bear an important relationship to the question of bleaching teeth. We are here considering only those cases where discoloration is the result of caries and death of the pulp in the usual way, excluding staining of the tooth-structure by metallic salts from fillings of amalgam or through the application of solutions of salts of certain metals which have been used in treatment. I have elsewhere

called attention to two main classifications of chemical bleaching agents into, first, those which owe their potency to their oxidizing action and which break up the composition of the color molecule by abstracting its hydrogen, and, second, those which act in the reverse manner, viz. the reducing bleachers, which owe their efficiency to their affinity for oxygen, and which act by removing *that* element from the color molecule. To the first class belong hydrogen peroxid, potassium permanganate, chlorin and the chlorin group of elements, and to the latter sulfur dioxide. I deem the classification so made to be important, as it bears directly upon the choice of the particular bleaching agent in a given case where a general idea of the nature of the color compound is had, or conversely it seems to indicate to some degree the nature of the color compound, according to the way it reacts toward a bleaching agent, the rationale of whose action is known.

Among the agents which have been used as tooth-bleachers, peroxid of hydrogen has been tried, and good results have been anticipated because of its peculiar chemical composition, whereby it readily parts with its loosely held extra atom of oxygen, and the known activity of nascent oxygen as a bleacher. This, with the additional advantage that by its decomposition nothing but water and oxygen result, both of which are non-poisonous and are without deleterious action on the tooth-structure, seemed to commend it to favor and warrant a belief in its usefulness. Until quite recently no results have been obtained sufficiently satisfactory to give it a place of importance in the list of substances suitable for bleaching tooth-structure. This has no doubt been due in a great measure to the practical difficulty of obtaining hydrogen peroxid in sufficiently concentrated solutions, those on the market and in popular use representing only about from two to three per cent. of the pure H_2O_2 . I exclude the bleaching method introduced by Dr. A. W. Harlan, consisting of the combined use of hydrogen peroxid and aluminum chlorid, because, while hydrogen peroxid is used in his process, its function is simply to liberate chlorin from the aluminum chlorid, and it is the free chlorin which is directly concerned in the bleaching, and not the hydrogen peroxid; so that the satisfactory results obtained by Dr. Harlan's method are to be credited to chlorin, and not to hydrogen peroxid.

The introduction of the stronger solutions of hydrogen peroxid in ether by McKesson & Robbins, under the name "pyrozone," the strongest of which is said to contain twenty-five per cent. pure hydrogen peroxid, will afford a better opportunity to test the value of this compound *per se* as a tooth-bleacher. I have used the caustic pyrozone for this purpose in a few cases, and found it prompt and satisfactory, but the results are too recent for me to determine the question of its permanency. The inflammable nature of the preparation and the extreme volatility of the menstruum are practical objections to its use which, though by no means insurmountable, are at the same time of sufficient importance to be worthy of consideration.

Quite recently my attention was called to the production on a commercial basis of the sodium peroxid Na_2O_2 , and of its utilization on a large scale as a bleaching agent for silk and woolen fiber and fabrics. Chemically speaking, sodium peroxid is the analogue of hydrogen peroxid. It is a white solid, strongly alkaline, and caustic.

I am indebted to Messrs. Roessler & Hasslacher, of New York, who are the American agents for this material, for the following data respecting it:

"Until recently, peroxid of sodium was only known as a laboratory product. The peroxids of potassium and sodium were known to Gay-Lussac and Thénard in 1810, and were obtained by them in small quantities. These chemists gave them the formulæ KO_3 and Na_2O_3 (old notation). The study of these substances was again entered upon in 1862 by Vernon Harcourt, whose analyses led him to the formulæ K_2O_4 and Na_2O_2 , instead of K_2O_3 and Na_2O_3 . He prepared them by heating the metals in an excess of oxygen in a silver vessel.

"In 1866, Professor H. Carrington Bolton devised a simple method for showing the formation of these peroxids, as a lecture experiment, by dropping bits of potassium or sodium into fused nitrate of potassium or sodium. The metal burns with a bright light and the mass becomes colored a deep red, in the case of potassium becoming yellow on cooling. Finally, in 1876, Fairley obtained the sodium compound crystallized with one molecule of water by adding peroxid of hydrogen to an excess of caustic soda solution of twenty per cent. and then pouring into alcohol.

" Na_2O_2 exhibits the following general properties:

"It dissolves in water, producing a considerable rise of temperature and evolving a certain amount of oxygen which provokes coughing. There is scarcely any loss of oxygen if the Na_2O_2 is stirred in gradually and in small quantities. It must be kept away from moisture, as it is very hygroscopic; exposed to air it gains twenty per cent. in weight in twenty-four hours, even when the surface is not disturbed.

"It should be handled with a little care, as when in contact with water and organic matter it may cause the latter to inflame.

"The commercial article contains about twenty per cent. of active oxygen, corresponding to the formula Na_2O_2 (20.51 per cent.), while peroxid of barium only contains about seven per cent. and hydrogen peroxid (twelve vols.) about 1.5 per cent. It dissolves without evolution of oxygen in dilute acids when the temperature is not allowed to rise, and a solution of hydrogen peroxid is thus produced.

"Cellulose is violently attacked by a warm, tolerably concentrated solution (fifteen per cent.) of sodium peroxid. It becomes yellow and disintegrates; when washed and treated with a weak acid, it takes a deep shade in a bath of methylen blue.

"This phenomenon is also produced, as is already known, when mercerized cotton is boiled with caustic soda solution containing hydrogen peroxid."

It differs from sodium oxid Na_2O just as hydrogen peroxid does from water,—viz, by its union with an additional atom of oxygen. It closely, if not exactly, resembles hydrogen peroxid in the readiness with which it parts with this extra atom of oxygen; and as is the case in bleaching with hydrogen peroxid, so in the case of sodium peroxid, it is the extra atom of oxygen in this compound which, when liberated, performs the bleaching function by seizing upon the hydrogen of the organic color compound, and so destroying its identity. Sodium peroxid differs from hydrogen peroxid in the important particular of its relative amount of available bleaching oxygen, which is stated to

be about twenty per cent., as against only from three to four per cent. in the ordinary commercial solutions of hydrogen peroxid. As a tooth-bleacher and sterilizer of putrescent canals and tubuli—for the former implies and includes the latter—it has an important additional property which is an advantage over hydrogen peroxid,—viz. its saponifying and solvent action upon the oils, fats, and animal tissue which permeate the dentinal structure, and which so often act as a formidable barrier to the ingress of the bleaching agents ordinarily used. This saponifying action will be seen at a glance when it is noted that the Na_2O_2 by the loss of one atom of O becomes Na_2O ; this immediately by combination with a molecule of water becomes NaOH , or the ordinary caustic soda which is used in the manufacture of soaps.

In presenting this compound for your consideration, I desire to direct your attention to two distinct aspects of it. First, the properties and uses of the compound *per se* in aqueous solution, and, secondly, the same with the addition of sufficient acid to neutralize it.

Sodium peroxid is, as before stated, freely soluble in water, with which it unites energetically and with the evolution of considerable heat, which can be controlled by adding the powdered compound slowly and in small portions to the water. This should always be done in making the solution, as decomposition of the material and consequent loss of oxygen results when the solution is carelessly made and allowed to become hot. It is desirable, in fact, to surround the beaker or vessel containing the solution with an outer vessel of ice-water until the compound has been completely dissolved. After having made a standard solution in this way by dissolving the compound in water to the point of saturation, other solutions of different known strengths can be made from it by adding water in definite proportions to measured amounts of the stock solution. In strong solutions sodium peroxid is a powerful caustic and solvent of animal tissue, as well as a saponifier of oils and fats. These qualities are modified and regularly lessened in intensity by progressive dilution with water. I have used in the treatment of pulpless teeth with putrescent canal-contents, solutions varying in strength from full saturation to one containing about five per cent. of the saturated solution. The most striking illustration of the valuable properties of this compound, and which will, I think, achieve for it a definite place in our list of valuable medicaments, is the effect produced upon those cases of offensive and putrescent canal-contents when the whole structure of the dentine is permeated and colored by a stinking and fermenting mass of decomposing organic matter, with often a blind abscess as an accompaniment to add to their foulness.

In the treatment of such a case in the lower jaw—and we frequently find the conditions as described affecting the sixth-year molars—I pursue the plan of flooding the pulp-chamber and canals with a strong solution (fifty per cent., or even saturated) of sodium peroxid, of course having the dam in position to prevent contact of the solution with the soft tissues of the mouth. The activity of the compound is at once made manifest by the evolution of gas, which takes place similarly to that which arises when hydrogen peroxid is used under the same conditions; the action is not, however, so violent or rapid as with hydrogen peroxid. It differs also in two other important particulars from hydrogen peroxid when so used,—viz. the bleaching of all

carious and discolored dentine in contact with the solution proceeds rapidly, and is quite visible in its progression during the few minutes' time employed in one application of the treatment. A zone of bleached dentine is easily observable in many cases, gradually increasing in extent by radiating, as it were, from the root-canal as a center, much as the circular wave produced by the fall of a pebble into a still surface of water gradually widens and extends to the entire surface.

In addition to this bleaching action of sodium peroxid is its valuable saponifying and solvent property. The small shreds of pulp-tissue and organic matter in a partially decomposed state are loosened from the canal-walls and tubuli and saponified, the mechanical effect of the evolution of gas by the action of the sodium peroxid greatly aiding in the cleansing process, which when fully carried out results in complete sterilization of the tooth by the action of a compound which combines the properties of a mechanical cleanser, a solvent of the organic *débris* and fats, a perfect sterilizer of the dentine, and an active bleacher. I have adopted the plan of neutralizing the alkali in teeth so treated by inserting in them for a moment on cotton a diluted solution of hydrochloric or sulfuric acid, afterward washing, and drying with hot air, and then immediately filling them, and out of a considerable number so treated there has not been one case of pericemental irritation even to the extent of tenderness. In the treatment of similar cases in the upper jaw my procedure has been in general the same, with the exception that the application of the solutions has been made upon pledgets or wisps of asbestos fiber, upon which the sodium peroxid solution has no action. Cotton cannot so well be used, because the compound in strong solution rapidly disintegrates it.

The description of the dental application of the compound has so far pertained to its use *per se* in the treatment of putrescent cases, where advantage was taken of its activity as a sterilizer and detergent, and not where its bleaching property was the first consideration. For bleaching discolored teeth I have used it in two different ways. First, by saturating the structure of the dentine with a strong solution of sodium peroxid, following this by treatment with a dilute acid, and second by first neutralizing the sodium peroxid with an acid, and afterward saturating the dentine with the neutral solution so made. The first has yielded the best results.

The rationale of these two methods is quite different, and the results differ accordingly. In the first case, where we use the pure solution of sodium peroxid, we have the advantage of its penetrating power resulting from its solvent and saponifying properties. It is non-coagulant, and neither the undecomposed contents of the dentinal tubuli nor the presence of oily or fatty matters are any barrier to its penetrative quality. It is itself a bleacher, and wherever it comes in contact with organic coloring-matter in the tooth-structure the color is more or less completely discharged. This point marks the end of the first stage of the process and differentiates it from the second, and I ask you to note and bear in mind that whatever of bleaching effect has been so far obtained is brought about by the oxidizing action of the atom of oxygen set free from the sodium peroxid by the reaction of that substance with the organic matter in the tubuli, with at the same time a reduction of the sodium peroxid to sodium oxid; this

in contact with the water present at once becomes 2NaOH , or caustic soda, which dissolves and saponifies the albuminoid and fatty matters present. The result of the bleaching process so far has been to leave the dentine of a decidedly yellow tint, owing perhaps to the action of the strong caustic alkali. The bleaching may be, and therefore should be, carried still further by treating the dentine now saturated with the sodium peroxid solution to a weak acid application. So far I have preferred to use hydrochloric acid. The effect of this acid treatment is not only to neutralize the strong alkaline solution in the canal and tubuli, but to bring about a further bleaching by reason of the reaction between the acid and sodium peroxid, which results as follows: $\text{Na}_2\text{O}_2 + 2\text{HCl} = 2\text{NaCl} + \text{H}_2\text{O}_2$.

The hydrogen peroxid thus liberated in the tubuli acts powerfully to expel the contents of the tubuli and to further improve the color, and leaves only NaCl , or common salt, in solution to be gotten rid of, which can be done sufficiently by washing with hot distilled water, though if any should remain it is probably without deleterious action. It will be seen, therefore, that sodium peroxid is not only valuable in itself for bleaching discolored teeth, and as an energetic sterilizer and detergent of infected dentine, but it furnishes us with a ready and easy means for procuring concentrated solutions of hydrogen peroxid for bleaching, for the disorganization and removal of purulent secretions in abscesses and pyorrhea cases, as an antiseptic solution for the irrigation of antral catarrhal cases, and the general antiseptis of the oral cavity,—in fact, for any use to which hydrogen peroxid may be legitimately applied. In the neutralization of the sodium peroxid the character of the sodium salt, which will remain as a by-product, is of course determined by the choice of the acid used for the purpose, hydrochloric giving NaCl , or common salt, sulfuric yielding Na_2SO_4 (Glauber salts), acetic acid the sodium acetate, all of which are practically non-irritant in dilute solution. For general uses I prefer hydrochloric, as before stated, because of its yielding common salt, which could not possibly be detrimental in any case where the use of hydrogen peroxid was called for.

I have used for bleaching a concentrated solution of sodium peroxid, exactly neutralized with HCl or H_2SO_4 , which latter is the basis of the methods used in bleaching silk and other fibers on a commercial scale by aid of the substance under consideration. But, as has been shown, when we neutralize a solution of sodium peroxid with an acid,— H_2SO_4 , for instance,—we have simply a strong solution of hydrogen peroxid, together with sodium sulfate, which is inert, and for dental bleaching purposes I have found the application of such a solution to give results inferior to the one first noted, of making the application of sodium peroxid until the dentine is saturated with it, and then following with an acid treatment, thus producing the hydrogen peroxid in the dental structure.

As to the permanence of results from bleaching cases by this method as described, I can only say that I have had this compound under observation in this relation only for about two months, and the time is much too short to enable me to speak positively. So far as my experience in the bleaching of teeth is concerned,—and I have tried all methods that I have ever heard of,—the one which I have had the pleasure of bringing before you this evening seems to be the most

satisfactory. It acts promptly and efficiently, it is on theoretical grounds most excellent, and practical tests of it thus far warrant me in at least bringing it to your attention, with the request that you will subject it to careful investigation, believing that you will find it worthy of a prominent place in the list of essentials for comfortable and successful practice.

CAUSTIC PYROZONE.

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

IN my opinion, the ethereal solution of hydrogen peroxid known as caustic pyrozone will very shortly be considered one of the most valuable topical drugs in the medicine cabinet of the dentist. From my experience with it in a number of cases, I am satisfied that for several purposes it supersedes anything previously at our command. Its chief employment, of course, must be upon pus-generating surfaces or tissues. Of these, it will be more welcome in the pockets of pyorrhea alveolaris than in abscesses or other pus-yielding diseases, though useful in all.

Its most marked and valuable characteristic is its affinity for pus. Brought into contact with it, there results a bubbling and rushing forth of the pus which will astonish those who see it for the first time. We are often led to suppose that pyorrhea has not yet attacked a specified tooth, because pressure will not force an escape of pus around the neck. I am satisfied now that many such seemingly healthy individual teeth, in diseased mouths, are affected, for I have been amazed to observe the free flow of pus in such cases immediately upon the application of caustic pyrozone. I think I can best describe the manner of using this drug by giving the record of a few cases.

CASE I.—Chronic pyorrhea alveolaris. Patient a man ætat thirty-five. In good general health. Using tobacco freely to chew and to smoke. Calcareous deposits upon the inferior teeth, mainly upon the lingual surfaces. Some deposits upon the superior teeth. Gums of both jaws much inflamed, bleeding upon the slightest touch. Pus oozing around necks of all teeth save the six anterior superior. Disease in its most advanced form around the wisdom-teeth, about which the processes had been almost entirely lost. Patient suffering almost constant pain, though with the exception of the wisdom-teeth none were loose, the pockets all being quite shallow.

Treatment.—Calcareous deposits removed as far as possible, resulting in copious hemorrhage. Because of the severe bleeding, I decided to treat with pyrozone, at the first sitting, only the six anterior superior teeth, which were least affected, no tartar being about them. This latter fact rendered scraping with instruments avoidable, and these teeth were therefore the only ones about which no hemorrhage had been occasioned. A small pledget of cotton, rope-shaped, was moistened with the caustic pyrozone, and with a probe introduced between the cuspid and lateral, being pressed up under the gum-margin as far as possible. There it was left until the appearance of foam indicated that pus had been found. This was perhaps from five to eight seconds. It was then withdrawn, and immediately there was a considerable discharge of boiling pus, finally escaping tinged with blood. The same treatment repeated about the others of the six teeth selected brought

forth a foaming mass which covered the adjacent parts as with a thick lather. The mouth was then rinsed with warm water and the patient dismissed for four days. At the second visit, so great a change had occurred that an application of the agent about the same teeth produced scarcely a perceptible escape of pus, save in one pocket. The gums were remarkably improved in tone, inflammation having almost entirely disappeared. The patient reported that the night after treatment was the most comfortable passed in months. At this visit the six anterior inferior teeth were treated similarly, and the treatment repeated four days later, by which time they had so far advanced toward recovery that I proceeded to take up the posterior teeth. I would call attention to the fact that I deem it wiser not to treat too many teeth in one mouth at the same sitting. It will be better to take those first which cause the most suffering, and make an application to them only. In this case, by the fifth visit the caustic treatment was abandoned, all pus having disappeared. The mouth is recovering rapidly under occasional dressings of an astringent nature, medicinal pyrozone being used as a mouth-wash. All pain has been controlled, and the teeth can be brushed without bleeding of the gums. I do not consider that this is a permanent cure, but it is the most rapid recovery to a condition of good health that I have ever seen.

CASE 2.—*Pyorrhea alveolaris* complicated with alveolar abscess. Patient, a woman of forty. Presented in great pain, occasioned by a well-defined abscess about an inferior cuspid. This was one of those rare cases where an abscess is present despite the fact that the pulp is alive. The pocket was not very deep, and other teeth were involved in the general disease; but I shall confine myself to this special condition. The gum at the lingual aspect was much swelled, and the discharge of pus copious. I cleansed the pocket by manipulation with the finger and by syringing with warm water until it appeared quite clean. I also packed the pocket with absorbent cotton, wiping pus from the soft tissues in this manner. I then, as in the above cases, inserted caustic pyrozone on a bit of cotton, passing it down into the pocket. In a couple of seconds the foaming was observed, and I removed the cotton. Immediately there issued forth a foaming discharge which completely hid all the neighboring teeth. At the second visit the patient reported that the pain had been greatly relieved, and I renewed the treatment, there yet being a free discharge of pus. Contrary to instructions, the patient remained away from the office for a week, and returned in pain, and with large quantities of pus escaping. I became satisfied that there must be some special cause for this condition, and after a more thorough exploration decided that there was caries of the alveolus about the tooth, especially involving the septum between it and its neighbor. With the engine-bur I operated, removing the dead bone freely. I then treated with the caustic pyrozone, and with a second application, two days later, reached a point where the tooth was as well as its neighbors, reducing it and them to a stage where they will be easily controlled. Pain, inflammation, and pus have all disappeared.

CASE 3.—Abscess without fistula. Patient presented with aching tooth. Removed old filling and found a putrescent pulp. Symptoms indicated that pus might be present about the apex of the root, but there was no fistula and no sign of one forming. Neither was there

any discharge through the root. I dressed the canal with cotton slightly dampened with caustic pyrozone, and left it in for one minute. Upon withdrawal, I was somewhat surprised to see the amount of clear yellow pus which followed. In this case I think that the wonderful affinity of pyrozone for pus caused its passage through the foramen, and once having passed that point, it continued to discharge itself through this vent which offered.

From my experience in these and other similar cases, I may offer a few suggestions to those who essay to use this drug. The first caution is as to quantity. A little will do all the good possible, while more will be harmful. The application is painful, producing what the patient will call a burning sensation. It will, however, be less painful applied to diseased surfaces than if placed upon healthy tissues. For this reason, and because the cauterizing of the healthy parts is undesirable, care should be taken that the cotton rope or tampon is not so saturated that when pressed into the pocket or fistula the excess will be forced out and escape upon other parts than those that are generating pus. If this should occur, pain will follow, which may be quickly relieved by rubbing freely with tannin and glycerol. Another objection to permitting the agent to reach the healthy surface of the gum is that it will produce an ugly white stain. Whether this is a true eschar or not, I am in doubt. The eschar caused by carbolic acid, salicylic acid, and other escharotics results in the death and exfoliation of the surface of the soft tissues. This does not seem to occur with pyrozone. I accidentally spilled some upon my fingers and afterward washed my hands, whereupon, within a few minutes, there appeared a chalky white stain, quite ugly in appearance. I feared that there would be a slough and a sore finger; but, to my utter astonishment, when I reached home it had entirely disappeared, the cuticle being as perfect as though no caustic had reached it. This led me to some experiments, the result of which I will state. Immediately after placing a drop of caustic pyrozone upon the finger a rapid evaporation is visible, with a sensation of burning. If the cuticle is broken, the pain will be great. If left untouched, in about twenty minutes a whitish stain will begin to appear, increasing slightly, till in half an hour it is distinctly visible. This stain will slowly disappear, vanishing entirely in three hours without medication of any kind. If, however, an effort be made to wash the caustic from the fingers, the stain will appear within ten minutes thereafter, and will be of intense whiteness and very conspicuous. The cuticle may be scraped off, and the stain will be found not to have penetrated beyond; but this cuticle will be seen, by the magnifying-glass, to be thoroughly stained throughout. Nevertheless, if undisturbed, this stain, though deeper than that found when water had not reached the part, will all disappear within from three to four hours. If gloves are worn or the hands placed in the pocket, the stains pass away within one hour.

A deduction from this is that any excess of pyrozone should be removed with bibulous paper and the application of water avoided. I think that the water simply softens the surface of the tissues, allowing a deeper penetration.

A SYSTEM OF CROWN- AND BRIDGE-WORK.

BY DRs. N. T. SHIELDS AND L. N. SHIELDS, NEW YORK, N. Y., AND GALVESTON, TEXAS.

THE points in this work to which we desire to direct attention are its permanency, absolute cleanliness, and artistic beauty. By the methods herein described the crowns are constructed upon anatomical lines, larger at the grinding- and cutting-surfaces, so as to admit of thorough mastication of food without injury to the gums. The ordinary shell crowns are positively wrong in shape and construction, because the normal crown has a larger diameter than the neck of the tooth, therefore a band made to fit the crown of a tooth tightly will be too large at the neck. This will necessarily leave a space for the lodging of food *débris* (although it may go under the gum), will make the gum present a very unnatural appearance, will make the gold tooth altogether unnatural in construction, and the result after a very few years will be a mass of decay under the shell crown, which makes it not only a temporary operation, but a constitutionally as well as a locally injurious one.

The enamel widens or becomes thicker the nearer it approaches the grinding- and cutting-surfaces, and in order to get a perfect junction of the collar crown and the neck of the tooth we must remove *all* enamel. Our procedure is as follows: We first destroy the vitality of the pulp in a perfectly painless manner, then extract all of it with

FIG. 1. FIG. 2.



Donaldson's nerve-canal cleansers. With a little patience and using No. 5 all-fine, and for every sitting a new cleanser, we can extract every particle from the buccal roots of molars and perfectly fill them to their respective apices. This done, the whole crown is cut off almost even with the gum; there will still be a thin portion of the enamel left surrounding the root, and this can easily be removed by using the No. 2 and No. 3 scalers made by The S. S. White Dental Mfg. Co. (See Figs. 1 and 2.) This done, we can shape the root for a solid all-gold crown, as shown in Fig. 3.

The procedure in the case of porcelain-faced crowns will be described later.

Around this conically shaped root (the removal of the enamel alone will generally shape it sufficiently) we now fit a twenty-two-carat gold band so as to come in contact with all parts of the conical portion of the root, which, when made, naturally gives us a conical band. To make this band, we first make a tin-foil model, as seen in Fig. 4; this causes less pain to the patient. From this an absolute shape in gold is obtained more quickly, and a saving of gold results. This band is soldered with twenty-two-carat solder, then placed in position, and its free margins ground down even with the root-end.

We next prepare the band for a pure-gold floor by taking a Butler corundum-point and hollowing out the upper or small end by beveling from the inside edge so as to allow room for the solder. Although only an infinitesimal amount of solder runs inside, still we must have

FIG. 3.



FIG. 4.



a place for that little to flow ; otherwise the band could not go back into place, on account of the solder flowing inside, and we must have the solder to flow inside in order to make a complete cone externally. Now take a piece of pure gold (No. 34 American gauge) and cut just a little larger than the band, anneal it and adapt it perfectly, then place the two in a No. 7 Melotte soldering-clamp (Fig. 5), and be sure they do not move ; place borax, mixed with water to a thin cream, all around the overlapping edge of pure gold, place a small piece of twenty-two-carat gold solder at the junction of the band and floor, and with a broad, gentle flame solder the entire floor with the one piece of solder and at the same moment. The clamp holds them firmly together, and the work can be placed back on the tooth without rocking. (Fig. 6.)

FIG. 5.



Now make the pivots (of platinum and iridium wire), and roughen them before placing in position. Drill holes corresponding with the root-canals, place the pivots in position, and fasten them to the floor with prepared hard wax. Now remove carefully, and invest pivots, floor, and band in equal parts of plaster and marble-dust, and after removing the wax with boiling water, solder the pivots to floor with twenty-two-carat gold. Now cut down the overlapping pure-gold floor exactly even with the band, also cut down the projecting ends of the pivots. This constitutes the foundation for a solid gold crown. Never make pivots for canals which cannot be thoroughly filled with cement. It is better to shorten the pivot somewhat and make it thicker, and depend for anchorage only upon the lower part of the canal, as shown in Fig. 7.

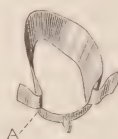
FIG. 6.

FIG. 7.

FIG. 8.

FIG. 9.

FIG. 10.



Now put the foundation in its position in the mouth (upper jaw, for example), and take an impression of the whole upper jaw in modeling compound, also take an impression of the whole lower jaw. Next remove the foundation, and place it with great care exactly in its proper matrix in the impression just taken, then stay it to the modeling compound with wax in two or three places ; be careful not to move it with the wax knife, dry the pivots and band on the inside, and cover the pivots with a film of wax, also run a film of wax around the band on the inside, but be sure to remove all wax from the edge of the band, because we want that to rest firmly upon the plaster. Now fill the impression with plaster to make a model.

After separating the model, remove the crown foundation from the model by making a hole, usually on the palatal surface, with a pocket-knife through the plaster to the apical end of the pivot. Now place the model and foundation in hot water, and with a little pressure on the end of the pivot the whole foundation is easily removed. Syringe out all wax from the model and foundation, and replace the foundation on the model.

Next make the stamp for a grinding-surface ; use for this pure gold, 34 American gauge, and fill in the cusps with twenty-two-carat solder. Melotte makes a very fine set of steel stamps that one can generally make use of, but a zinc cast of any tooth can be made in a few minutes by simply placing White's prepared molding-sand, always ready for use, in a ring and gently imbedding the grinding-surface, and in a minute by the watch a small quantity of zinc can be melted and poured into the impression in the sand. The molar or bicuspid stamp is made in the usual way by placing the pure gold, always well annealed, on a piece of lead and striking a few light blows on the die, which gives a perfect grinding-surface, as seen in Fig. 8. This is the reverse side of a stamp of a superior left first molar.

Next trim off all surplus gold, leaving the grinding-surface as represented in the cut. The cusps are next filled with twenty-two-carat solder. The reason we use twenty-two-carat solder is, when we fill in the whole space between the grinding-surface and the foundation with twenty-carat solder there is no danger of the twenty-two-carat being melted out of the cusps, and consequently no danger of having an air-bubble just under the grinding-surface of No. 34 pure gold, which, of course, would make itself visible after a few days' use.

Having taken a full impression of both upper and lower jaws, we are able to get an absolutely correct articulation. We now add wax to the foundation, which can be removed from the plaster, until we get an exact articulation with the pure-gold grinding-surface. After having gotten this with hard wax so that it may be manipulated without disturbing its position, we continue to build out the tooth to its anatomically correct contour with wax, frequently trying it into place. After the foundation is removed from the plaster, the plaster is cut away from between the foundation and the adjoining teeth without disturbing the plaster upon which the band rests. When this plaster is removed, wax is added up to the very edge of the band, so that the entire anatomical contour can be restored with gold, including even that of the enamel chipped off at the cervical margin. The wax tooth should always be tried in the mouth, to be sure that everything pertaining to form, contour, and position is just right. This was the object of removing the foundation from the plaster model at the outset, as it is a great advantage, and particularly so with facings, to always just at this time try the tooth in the mouth.

Now from a piece of tin foil (No. 60) a model is cut so as to fit the wax exactly. We cut the gold on the palatal surface from the height of foundation (see A, Fig. 9), thereby enabling us to join the free ends at the cervico-palatal surface. The large ends of the gold we turn out and back, so as to stay it in the investment of plaster and marble-dust. The gold can be cut a little long, so as to allow of bringing the cervical ends together. This cervical margin is very

important, as shown in Fig. 9. Sometimes three pieces of gold are used instead of one, but if so the pieces of gold should always be cut with projections (as seen in Fig. 10) so as to retain the exact shape of the tooth and not pull in from the instrument when soldered. This gold band must fit just under the edge of the grinding-surface stamp, and in perfect contact with it, so as not to allow the grinding-surface to move. This little thickness of pure gold, No. 34 American gauge, must be allowed for when we wax up the tooth.

Now we have the wax tooth thoroughly boxed in, excepting the palatal surface. Before taking the next step, be sure that the pure gold band for boxing is in contact with the cervical margin of the foundation-band. At the point of junction here and at the grinding-surface place a little wax, and then cut all possible surplus away, leaving only the very junction filled; also be sure no wax gets on the inside of the cervical margin of the foundation-band. Now place the tooth in water and invest it in plaster and marble-dust, covering the whole tooth except the palatal surface of the crown; the plaster must just cover the narrow gold joined at the cervical margin. After the plaster sets, boil out the wax and cut the investment as small as possible, leaving the plaster only about one-eighth of an inch all around. Now dry thoroughly, but not in contact with a flame; have something—a top of a tin box, for instance—between the flame and the tooth. After it is dry, place it in the flame of a small Bunsen burner. To hasten the heating-up process, a foot blow-pipe may be used to get it red hot very quickly, but nevertheless the heating up is to be done cautiously, and during this time we still have the little Bunsen flame under it. Now by applying the flame of the Knapp blow-pipe the gold flows with the greatest ease in all parts and in all directions, like melted butter. Here we use twenty-carat solder. We about half fill the molar with gold, using borax as a flux, before we use the Knapp blow-pipe.

It should be observed that we have the solder almost to the melting point, everything is red hot, and a hot flame beneath the investment, so that when we gently apply the Knapp blow-pipe flame the gold simply drops, and while in this molten condition we add the rest of the solder, never allowing it to cool for one moment, for if it does air-bubbles will result. Here the gold boxing-band at the cervico-palatal margin does its work beautifully; the gold flows freely all around, with no danger of solder running inside the foundation from the palatal side. The plaster and marble-dust should always be worked as stiff as possible, so as to always have the gold in contact with plaster, which will not be the case if the investment is mixed thin. The necessity of having everything firmly held, so that the gold solder will not pull it in and change the entire shape of the crown, becomes evident when the large amount of solder used is considered. This being a solid crown, we put it in water to cool it, and next in sulfuric acid very dilute, and gently heat it to remove adhering oxid. Now we can shape the gold to anatomically correct contour lines and bring the cervical margin down to a feather-edge, so that when again placed on the root we have an absolute junction without a lodging-place for acids, and the whole tooth restored to a state of perfection. (See Fig. 11.)

FIG. 11.



We use dento-plastique to set our crown- and bridge-work. In the construction of a crown with a porcelain face, the root is shaped just as for a solid crown, excepting that it is cut under the gum on the labial surface, and also lower on the palatal surface, so as to remove all enamel (Fig. 12). After we cut under the gum we hold the gum back by anchoring premium gutta-percha in the root-canal and press it over the labial surface. After the crown has been set, the gum comes down beautifully over the gold band and prevents its being visible. Prepare and complete the foundation the same as for the solid crown, taking impressions, bite, etc., as before, and select the shade. Now prepare the facing carefully as follows: Grind the facing shorter than you desire by the thickness of No. 34 gold plate; grind off both angles left at the cervical portion, and also grind the cutting-edge on the palatal side from pins to cutting-edge, leaving a feather-edge at the cutting-surface; likewise grind the cervical portion from pins to cervical margin, leaving this margin also a feather-edge; also remove angles from pins to approximal margins, the object being to give a perfectly convex contour to the palatal side of the facing.

FIG. 12.



After grinding off the heavy angles with the lathe, use disks in the engine, and be sure that all angles are removed. Sometimes it is even necessary to go between the pins with a disk. Now take Scotch

FIG. 13.



stone and make perfectly smooth, edges particularly, or the gold cannot be brought in absolute contact. Three different views of a facing so prepared are shown in Fig. 13. The surface where the pins are being the highest part, the grinding of the

FIG. 14.



palatal surface is done so as to fill in with twenty-carat solder and give all the strength that would be obtained if we ground the cutting-edge off square, for when the tooth is finished we have a slightly beveled surface of gold at the cutting-edge, the facing having only a feather-edge; but that edge is well protected, so we get great strength. We secure, besides, artistic beauty by having the facing exactly the shape of the natural tooth on the whole labial surface. By this method of shaping the facing we never have a tooth to crack, because there are no angles, and finally the solder will flow perfectly around the cervico-labial surface.

Now we take this facing (being sure that the palatal surface is clean) and back it with pure gold, No. 34, allowing the gold to project a little at both cervical and cutting-edges. In order to back this facing so that the pure gold is in absolute contact with the facing, we have to anneal three or four times, and sometimes six, each time pressing it in contact with the facing with a broad instrument like a plastic spatula, No. 20 (Fig. 14). Never stop annealing and working to place until the tooth can be held in contact with the backing at the cutting-edge and permits no motion of gold at the cervical margin. The same with the approximal surfaces. Now

hold the tooth and backing between the thumb and middle and fore-fingers tightly, and with the point of a pocket-knife push the gold into hard contact with the pins all around, using the very point of the knife, and there will be no occasion to bend the pins; besides, it makes a perfect gold surface.

Now place the facing with its backing on the foundation, wax up with hard wax, and try it in position in the mouth. If doubt exists as to the correctness of the position, stay it well with hard wax, then try again for position. After obtaining it, finish waxing up

FIG. 15.



until the contour is exactly anatomically correct, leaving a little margin all around the backing so as to be perfectly boxed in. This is done just as in the case of the molar, by making a tin-foil model (Fig. 15) and bringing the gold into absolute contact with the backing, because if a small space is left borax will run through and crack the tooth. Great care must be exercised with regard to this contact.

This cuspid box may be made in two pieces, joined at the cervico-labial surface the same as seen at the cervico-palatal and cutting-edges. When we bring the gold across the cutting-edge, which has

FIG. 16.

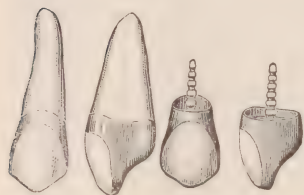


the gold projecting a little, not bent over the edge, but projecting in perfect contact, we make the pure gold go just a little lower than the cutting-edge, so as to have a little bevel of twenty-carat gold, so slight that it cannot be seen (Fig. 16). For exceedingly heavy use we leave the bevel a little thicker, but even that is scarcely noticeable. Now we fill in the junction of the boxing with the backing, and also of the cervical margin of the foundation with wax, and invest the

same as for a solid crown, allowing the plaster and marble-dust to come over the cervico-palatal boxing, etc.

To solder this crown, place but a few pieces of twenty-carat solder and borax in before using the Knapp blow-pipe, because we want the

FIG. 17.



first gold to flow perfectly at the cervico-labial surface and so avoid air-bubbles, after which the course is clear. After the soldering is completed, place the crown under a little box, so that it may cool off slowly and no draught can reach it. When cold, boil in dilute sulfuric acid. This gold will cut down absolutely in contact with the tooth, and when the cutting-edge is finished with a slight bevel, it will be seen and under-

stood what great strength has been secured, with at the same time a beautiful labial facing of porcelain. When the cervical surface, in fact the whole crown, is finished up in the thorough and artistic manner of which it is capable, it becomes a piece of perfection. (See Fig. 17.)

A bicuspid is made exactly the same as a cuspid, with the exception of the stamp. Make the stamp, and fill the cusps with twenty-two-carat solder, then hollow out the buccal cusp to fit the cusp of the facing, and place a very narrow piece of pure gold at the junction on the buccal surface, and continue as in the cuspid. (See Fig. 18.) If the bicuspid is a short one, do not be afraid of cracking the facing;

grind and make it exactly as directed, and it will not crack. Notice the curve in the bicuspid cut.

For a bridge-tooth, we will take a superior right cuspid. Now we will describe something which we deem of the greatest importance. When you grind a tooth to fit the gum you necessarily expose the small porosities in the body of the tooth, which always have a tendency to lodge food, which will produce offensive breath. We have corrected this defect most positively. We shape up this cuspid exactly the same as if we were making a crown, and back it up the same way. Now we flow wax over the whole surface, and regulate the thickness of the wax according to the required fullness of the tooth, boxing in with pure gold the height of the wax and restoring the shape of the lost tooth; then invest to the top of the boxing, and after the proper steps of investing fill in with gold. Here there are two great points to observe. First, this gold can be finished absolutely smooth, so that nothing can collect in the way of food, hence nothing but perfect cleanliness can exist. Secondly, any amount of absorption of gum can be counteracted by building out with gold exactly the amount of absorption. This will give the tooth a natural position, a perfectly smooth palatal surface, and restore the lip to its normal (or in case of a cuspid almost normal) expression.

FIG. 18.



(To be continued.)

A SMALL BRIDGE TO CORRECT AN IRREGULARITY.

BY NAAMAN H. KEYSER, D.D.S., GERMANTOWN, PA.

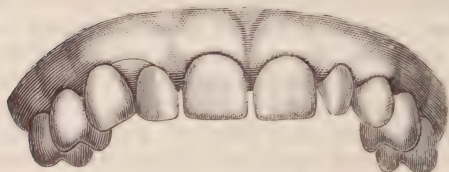
I HAVE recently constructed and inserted, with very satisfactory result, a small bridge to correct an irregularity in the mouth of a young lady whose left upper lateral had not erupted. In consequence of this non-eruption, the cuspid had greatly changed its position, leaning forward and outward, and in addition was disfigured by a large and conspicuous gold filling, presenting an unsightly appearance, as shown in Fig. 1. For several years she had worn a small suction-plate, carrying a tooth which occupied the space between cuspid and bicuspid. This she was anxious to dispense with, and also, if possible, to improve the general appearance of the anterior teeth. To accomplish this the following plan was adopted. The cuspid was prepared as for crowning, leaving as much as possible of the palatal portion standing, and yet allowing sufficient space to accommodate the pins of the artificial teeth. The labial portion was cut slightly below the gum-margin, as is usual in such cases. Into the root was inserted a strong platinum pin, a collar of the same material was adjusted around the palatal portion, and an impression taken with both in place. With the cast thus obtained I carefully fitted a piece of platinum to cover the entire top of the root. This with the pin and collar properly adjusted to each other to form a cap was then soldered together with pure gold, using as little of the latter as possible and soldering with a high heat, thinking thereby to more thoroughly unite the metals and

thus raise the fusing-point of the gold, and lessen the liability of disarrangement in subsequent manipulation. The teeth, a lateral and a cuspid, were then arranged and adjusted in the mouth, and afterward soldered in the usual way, using platinum throughout and soldering with pure gold only. In order to cover the portion of platinum cap showing between the teeth, I proceeded in the following manner. I first roughened the platinum and then placed upon it a small portion

FIG. 1.



FIG. 2.



of continuous-gum body, covering this with a little gum-enamel. It was then carefully fired in a continuous-gum furnace. The fixture was now ready for the mouth, and was secured in position with gutta-percha. When in position its appearance was all that could be desired (see Fig. 2), the small portion of porcelain gum between the two teeth matching the natural gum in color, nicely blending with it, and presenting a very natural appearance.

ELECTRICITY IN ROOT-FILLING.

BY CARL THEODOR GRAMM, M.D., KEOKUK, IOWA.

(Read before the Chicago Dental Club, November 28, 1892.)

THE theme of root-filling is such a trite one that I have hesitated to make it the subject of a paper or clinic. I believe, however, I have devised a practical method possessing new, meritorious features; and inasmuch as the dentist of the day is in need of a means by which fine tortuous root-canals may be sterilized, hermetically sealed at the apex, and filled thoroughly, *absolutely*, I deem its presentation permissible.

The means indicated below, properly applied, will not only accomplish this object, but do more; for should any vestige of pulp or matter of any kind remain within the canal, this "matter" will be desiccated, sterilized, and lastly permeated by the filling-material.

The operator is to consider the root ready for filling, to have rubber-dam in position, and the canal wiped as dry as possible. A "copper canal-point," just fine enough to easily fit the canal, and long enough to allow one end to remain directly visible, is inserted. By

means of a storage battery (thirty-five ampere capacity) an electrode is brought to a bright red or white heat and held in contact with the protruding copper point. If there be much moisture in the canal, a hissing sound is heard almost instantly. Contact may be maintained until slight pain ensues, and if necessary, renewed until that object—namely, perfect drying of the root-canal and largely the tubules—is attained. The point may then be removed, and after the canal has been moistened with oil of eucalyptus, again inserted. Exception to removal of the point is found whenever the canal or canals, as in the molar group, are exceedingly narrow; in these instances it will quite suffice to drench the floor of the pulp-chamber, leaving the cone in position.

The medicament will readily follow the point, and indeed move beyond it, owing to capillary attraction. The heated electrode is again applied with a view to increased germicidal energy, and to greater penetration of the heated oil and its pungent vapor into the remotest recesses, into possible pulp-remains, and partly into the tubules of the dentine. A sufficient quantity of base-plate wax is then packed into the pulp-chamber, and for the third time the heated electrode is applied. Almost instantly the melted wax will follow the course of the point to its remotest end, and attracted by the oiled walls will penetrate every crevice presented.

Again, as before stated, any shred of pulp or foreign matter left within the canal, having been first dried, then rendered aseptic, will now be permeated and imbedded by this filling-material, thus preventing decomposition thereafter. The point is to be left in position, cut short, or bent over, and a layer of cement placed upon it; this latter is an unnecessary addition if the crown cavity is to be filled with amalgam.

The argument in favor of the various factors entering into this operation may be summarized as follows:

Copper canal-points (suggested by the writer; *vide* DENTAL COSMOS, September, 1890) find their value in (1) ready conduction of heat, and thereby thorough desiccation of the canal; (2) their various sizes, the most attenuated corresponding to the finest hair-bristles; (3) being cone-shaped and thus adapted to the walls of the canals; (4) being readily inserted and removed in even remote positions.

Eucalyptus oil is commendable because of its wonderful germicidal, stimulating, and healing properties, and its affinity for the filling-material, securing better adhesion to the walls of the canal and increasing capillary movement of the wax globules.

Wax as a filling-material is valuable in being impervious to moisture, inert, and not subject to decomposition nor absorption.

Heat as applied favors desiccation of canal and contents; destruction of pathogenic organisms; increasing the penetration and antiseptic energy of eucalyptus by giving rise to pungent, antiseptic vapors; it also favors melting the wax, causing it to spread throughout the canal.

Lastly, a word as to the storage-cell or battery, the value of which in dental practice has been too long overlooked. The use of this battery in furnishing power for small motors and light for examination of nasal, oral, pharyngeal cavities, and the teeth, in furnishing abundant heat in desensitizing dentine, in drying and sterilizing a root-

canal, in removing painlessly and without hemorrhage epulic and polypoid growths, in cauterizing indolent, ulcerated mucous tissue, makes a storage battery, be it only a small one, an invaluable adjunct to the operating-room.

The use of electricity need not be confined to the operator having access to a light or power system. The simple and inexpensive manner in which such a battery may be charged and kept charged, makes it a practical instrument to the dentist in a small hamlet.

It is not within the scope of this paper to dwell upon the management of storage batteries, though the subject is fascinating.

The electrical spirit pervading and making itself useful in many arts and sciences should receive a warmer welcome at the hand of the dental practitioner than it has been granted. When studied and cultivated it will extend its helping hand in many instances to lessen the weariness of the dentist's labor, and, as in root-filling, to improve greatly the services he renders.

TREATMENT OF DIFFICULT CANALS IN MOLARS.

BY DR. W. R. BLACKSTONE, MANCHESTER, N. H.

(Read before the Second District Dental Society of the State of New York, November 14, 1892.)

MR. PRESIDENT AND GENTLEMEN,—This subject is one on which I have consumed a vast amount of time in experimenting, especially with respect to the buccal roots of molars, the small, delicate bi-rooted superior bicuspid, and the roots of inferior molars. I think in my practice I have had more trouble in treating and preparing the buccal roots of the superior molar. We will take, for example, a case that was presented to me,—a lady, twenty-two years old, with an aching left superior molar. On making a thorough examination, I concluded to devitalize the pulp by the use of arsenious acid. After making the application, the cavity was sealed with a pellet of cotton, saturated with a solution of gum sandarac, and the patient advised to call in two days.

She came at the appointed time, and had suffered no inconvenience in the mean time. I removed the dressing, and found the pulp completely devitalized in the palatal root, and I should judge for about one-fourth the length of the roots in the buccal canals. No trouble was encountered in removing the remains in the palatal canal; but in trying to extract the pulp of the buccal roots, I made a most pronounced failure; it was utterly impossible to introduce the most delicate instrument more than one-quarter of the distance, and in doing so it would touch a very sensitive spot. At last, tired of my unsuccessful attempts, I cleansed the palatal canal, and filled it with an iodoform paste covered with gutta-percha. I made an anodyne application, sealed the cavity with cotton saturated with carbolated resin, and dismissed the patient, informing her it was impossible to extract the pulp at that sitting. I allowed the tooth rest for a week.

To make a long story short, she became dissatisfied and changed dentists. She was advised to have the canals reamed and filled immediately, which was done. The customary time elapsed for the formation of an alveolar abscess. Dissatisfied again, she called at my

office and insisted on the immediate extraction of the tooth, which was done. After examining the tooth, I found it was utterly impossible to prepare and fill the buccal roots on account of their irregularity and decided curvature.

At that time I came to the conclusion that I should adopt an entirely different procedure in the treatment and preparation of canals, especially the buccal, of the superior molars and bicuspid, the inferior incisors and molars. The method, which has proven to be entirely successful, so that I have no hesitation in recommending it in all such cases, is *not to fill them at all*. How many of such canals are absolutely filled to the apex and hermetically sealed? It is doubtful if one in one hundred is thoroughly closed. There must be an intervening space between the filling and the apex, and unless the end of the root becomes encysted, so to speak, there must be an exudation of a small amount of fluid into the canal; this becomes putrescent, and finally inflammation of the peridental membrane results. If space necessarily exists in ninety-nine out of every one hundred of such cases, why not have it the entire length of the canal? For we can safely say that we will have no more trouble with one than with the other.

The manner in which I dispose of a superior molar with a putrescent pulp which has been devitalized by arsenic, or has died as the natural consequence of exposure, is first to adjust the rubber-dam and gain access to the pulp-chamber and canals by the liberal use of burs and chisels; but previous to opening into the canals a solution of hydrogen peroxid and bichlorid of mercury is injected into the cavity, which is kept well filled with the antiseptic solution during the process of preparation. After the cavity and pulp-chamber are thoroughly free from carious matter, I proceed to remove the remains in the canal by the use of small broaches and hooks made from piano-wire and platinum, followed by reaming slightly at the entrance to the canals, keeping them and the cavity well filled by repeated injections of the bichlorid solution. When satisfied that all particles of pulp and *débris*, "as far as possible," are removed, the process of drying is next undertaken. This is done by the use of the hot-air syringe and the Evans root-drier, followed by dressing the canals with a solution of iodoform in oil of eucalyptus, subsequently using the hot-air syringe until the eucalyptus is evaporated, leaving the canals well lined or covered with a coating of iodoform.

Here the operation is completed, so far as the canals are concerned. Filling the pulp-chamber with an oxyphosphate cement and the cavity with gutta-percha, the patient is dismissed, and advised to return by appointment to have the treatment completed by filling the cavity with gold or amalgam. Theoretically and scientifically, this method may be unsound; but practically it is a perfect success. The cases are very rare that return with symptoms of pericementitis. If inflammatory symptoms arise, the use of cotton saturated with methyl chlorid applied to the affected parts produces very gratifying results. Should the case become obstinate, and the inflammation not subside by the use of counter-irritants, the filling is removed, or an opening is made through the alveolar process to the apex, which I am happy to say is seldom necessary.

The superior bicuspid, inferior incisors, and the anterior roots of lower molars are treated substantially in the same way, and invariably with pronounced success. The roots that have larger canals, such as

central incisors, cuspids, posterior roots of inferior molars, etc., are prepared and treated with the same care as previously stated, but in no case is the canal filled to the apex. I depend entirely on the roots being thoroughly aseptic before filling the pulp-chamber and cavity. Nature completes the operation more thoroughly than the most skillful operator, by encysting the apex of the root, which is accomplished as well with the canal empty as when filled, without the injurious effects that might occur from forcing particles that may be retained through the foramen by the materials used in filling.

Of course there are exceptions to all rules and methods, and the only one in this case is the preparation and treatment of cuspids, central and lateral incisors, for crown- and bridge-work, where we depend on the post for strength and durability. In such cases the canal is filled as near to the apex as possible with a stiff paste, made from oil of eucalyptus and iodoform, to prevent air-pressure and the possibility of cement being forced through the foramen when adjusting the crown or bridge. In using the screw-post for molar and bicuspid crowns, the canals are reamed to correspond with the size of the post. By the use of cement mixed very thin, it is gently inserted and held firmly until the oxyphosphate has thoroughly hardened. When the operation is completed, you have a canal that is virtually empty, but one that can be trusted with the utmost confidence.

Gentlemen, if you are skeptical, and this method seems unscientific and at war with all theoretical procedures, you will find it by actual experiment, if you think it worthy of a trial, to be one of the most successful and satisfactory methods of preparing root-canals.

TRANSLATIONS.

PENTAL-ANESTHESIA.

BY PROFESSOR L. HOLLAENDER, HALLE-ON-THE-SAALE.

(Translated by WILLIAM LOMBARDINO, D.M.D., Berlin, Germany.)

SINCE my first publication regarding pental in the monthly therapeutical journals of December, 1891, and January, 1892, so many communications concerning the same have appeared that I concluded it would be advisable to publish my further experiences.

However, no one individual could verify every single observation of mine; but since one agreed in one point and another in another, the communications as a whole are in unison with the facts I have already published.

Concerning the state of the narcosis, with quiet people who inhale easily and with confidence, and those in whom the mouth and nose are entirely covered by the mouth-piece of the Junker apparatus so that no pental vapors enter the eyes, the anesthesia is induced in from one to three minutes without the least change in the expression of the face, without any irritation of the conjunctiva expressed by lachrymal secretion, and without any irritation of the nose, larynx, or posterior nares.

The condition of narcosis shows itself at times through a hang-

ing backward of the head or wide-open eyes, mostly with enlarged, seldom with contracted, pupils; or through slight twitching of the fingers; or when the hand of the patient, raised by the operator, drops. Where these symptoms do not show themselves, I am satisfied, after having used ten c.cm. of pental, that anesthesia is induced; although I require in most cases from five to six c.cm., yet very often only three c.cm. are necessary. In such quantities as the above, the patient will open the mouth when requested, but when larger quantities are used will keep the mouth firmly closed. Nevertheless, this has not compelled me to use a mouth-wedge, since on waiting a short time the mouth opened of itself. I have, in one administration, been able to extract as many as six to eight teeth and as many roots.

Lately I have not administered larger doses than above mentioned, and never induced anesthesia which lasted more than three to four minutes, although at the surgical clinic in Halle operations were performed under the influence of pental which required half an hour.

In all my cases I did not observe any stopping of the heart's action or respiration, and never any chest pressure, which is very often noticed after the use of nitrous oxid.

Notwithstanding, I must admit that in the last two or three hundred cases I was very particular in the choice of my patients,—*i.e.*, seldom anesthetized very anemic persons with weak heart-action, and in the case of very excited people used pental in small doses with the admission of considerable air, or desisted in case the excitement of the patient did not lessen.

For the most part, in a third of my cases, I had perhaps to deal with an incomplete anesthesia, in so much that consciousness remained while the will-power disappeared.

Herein pental differs greatly from chloroform, since according to most authors disagreeable after-effects are the result of an incomplete chloroform-narcosis, while with pental this is never the case.

Regarding the administering of pental, I am always obliged to reflect that narcoses with the common Esmarch's mask, with or without a cloth covering to prevent evaporation of material in the vicinity, are never so successful as with the Junker apparatus.

The manipulation demands a certain practice. Above all, the opening for admission of air must be very wide, and care must be taken that the rubber tube does not bend, otherwise the entrance of the vapors is prevented. The bulb must not be pressed too often or too strongly; the slower the pental enters the lungs, the more satisfactory the effect. Anesthesia is also induced more pleasantly and quickly. The bottle must not be entirely filled,—about a third is sufficient.

For one administration, where five or six teeth or roots are to be extracted, I am cautious, and pour from fifteen to twenty c.cm. into the bottle, since the remaining pental can be preserved, as it does not decompose. The return to consciousness after the narcosis is, as I have already stated, gradual. Even when the patients begin to look about, still they are ignorant as to their whereabouts or what has happened to them. However, as soon as full consciousness returns they are aware of everything that occurred; then only a minute or so elapses before they leave the chair and depart.

Perhaps a few may still complain of a slight weakness, or itching in the hands and feet. Aphasia, giddiness, or violent headaches, trembling

of the whole body, trismus, lameness of the tongue, etc.,—conditions described by Scheff,—I have never observed. (*"Handbuch der Zahnheilkunde,"* Wien, 1892.)

I have only noticed very little excitement, which was probably due to slowness in administering pental, and removed the same by immediate withdrawal of the mouth-piece from the patient, and not continuing until disappearance of all agitation, which, as a rule, lasted from ten to thirty seconds. I noticed a contraction of the larynx in the case of a tall, robust young man, a student of medicine, about twenty-three years of age. He had hardly inhaled two or three times before he complained of asphyxiation, and after three or four further inhalations he snatched the mouth-piece away, left the chair, and began to run up and down the room, trying violently to obtain breath; at the same time he stated in considerable excitement that he experienced such itching in the hands and feet, especially in the muscles of the upper arms and legs, that he hardly could endure it. Only by running back and forth could he find some alleviation. After this had lasted five minutes I allowed him to inhale five or six drops of amyl nitrite from a handkerchief, upon which his condition greatly improved. An itching sensation in the toes remained for a little time, then all was well. Since this was the first case out of eight or nine hundred narcoses, it may be classed as uncommon in pental-anesthesia.

Scheff states that in seventy-two cases he observed twelve cases of opisthotonos, in perhaps nine hundred narcoses. I only noticed one case of opisthotonos, and am convinced that this is not a dangerous condition. My case was that of a very anemic girl, eleven and a half years of age, whom I anesthetized in the afternoon, and who had just recovered from an attack of scarlet fever, which she had had four weeks previously. In this case I apparently had to do with a reflex condition, something which is not uncommon with hysterical people, which disappeared in from ten to twenty seconds without the patient complaining of any later disagreeable feeling.

All cases of opisthotonos which Scheff observed were only of a reflex nature, since in reality opisthotonos occurs only in cases of inflammation of the medulla spinalis or medulla oblongata, strychnin-poisoning, etc.

In general, I noticed that all pental-anesthetics carried out in the forenoon were more satisfactory than those done in the afternoon, or immediately after a meal. At the dental clinic in Vienna, all narcoses are carried out between six and seven in the evening.

When the operation is finished, if patients have not entirely regained consciousness, I do not try to hasten recovery, but wait for a natural return.

Perhaps the attempt by some dentists to immediately arouse patients after extraction is the cause of their not recovering more quickly, also of their complaining of all kinds of disagreeable after-effects. Violent headaches, which some patients are supposed to complain of after the narcoses, I have never observed; even slight headaches were entirely absent in all patients anesthetized by me. Moreover, some patients who came to me with severe headaches said after the narcosis that they did not experience further pain in the head.

A peculiar after-effect which as yet I have not noticed mentioned by any observer is that most patients are affected with a ravenous

appetite. At all events, this result is a splendid contrast to that of chloroform or ethyl bromid, after the administration of which, at times, vomiting and nausea are the consequence. During my wide experience with pental, neither annoyance of the stomach, vomiting, nor nausea resulted. According to a personal communication of Dr. Alt, the ravenous hunger felt at times after such a narcosis originates from the action of HCl in the stomach, which is set free in larger quantities through the influence of pental, which is eliminated partly through the secreting glands of the stomach, and thereby at the same time effects a separation or setting free of HCl.

If the materials or means are stronger, a desire to vomit is caused, showing that ravenous hunger is a precursor of the longing to vomit, which happens in the case of chloroform, ether, and other narcotics.

If we desire to expound the action of pental upon the entire organic system, then we are obliged, above all, to return to the effects of amylene hydrate, from which, by the extraction of one atom of hydrogen, pental is obtained. The influence of amylene hydrate upon the heart's action is of little or no consequence. In moderate doses, it works preferably upon the cerebrum; in larger quantities, upon the medulla oblongata and medulla spinalis; in very large doses the reflex disappears, breathing ceases, and finally the heart stops beating. The blood-pressure is slightly influenced. The only difference between amylene hydrate and pental is that the latter is insoluble in water and exceedingly volatile, accordingly is taken up by the body through the lungs very rapidly, even more quickly than ether; whereas amylene hydrate is soluble in water, and the effect much slower, perhaps fifteen to thirty minutes, because it is first gradually absorbed when in the stomach. The effect is the same, only the time required to produce the result is different.

From this is concluded that the anesthesia should be induced as slowly as possible, with the access of a considerable quantity of air, a fact to which I have already called attention. Other than the known facts regarding amylene hydrate have as yet, in the case of pental, not been disclosed by physiological experiments.

Schirmer says correctly, in his excellent article on pental (*Deutsche Monatsschr. für Zahnheilkunde*, May, 1892): How pental acts, it is with certainty impossible to state. The entire anesthesia with this material more than in others seems to show that the inhaled gases are simply mechanically mixed with the blood, and that no chemical union takes place. The blood is merely a vehicle for the pental, which in some inexplicable manner, as is the case with other narcotics, arrests the functions of single nerve-centers. All further blood-pressure experiments upon animals will reveal just as few particulars regarding the effects of pental as those already published by different parties.

The agitation caused by the tying of an animal to the experiment-table, and the inhaling of the exceedingly disagreeable vapors, is sufficient to produce an unsatisfactory picture of the narcosis, and from the outset must cause excitement or cessation of the heart. The same refers to respiration. Moreover, it is well known that all narcotics have quite an unlike effect upon different animals; *e.g.*, that of the dog is quite a contrast to that of the rabbit, and results obtained through experiments upon these animals are not, in the case of a human being, always trustworthy.

In the case of very irritable, weak, and excited individuals, a decidedly different picture from that of healthy and quiet people presents itself in the anesthesia. If, before the introduction of chloroform, blood-pressure and other physiological experiments upon animals had been made, perhaps the use of chloroform would have been rather doubtful.

In 1867 nitrous oxid was first introduced into Germany, and the physiologists were the first, upon foundations of their own experiments, to protest against its use, and all other investigators with Ludimar Hermann claimed that laughing-gas was no anesthetic, but an asphyxiant. Nevertheless, since then nitrous oxid has had a triumphant career the world over. Only through clinical experience and observations upon the human being can we be enlightened as to the administration and effects of penthal, and also obtain means to guard against or prevent any accompanying danger.

Lately two deaths were reported from the use of penthal, without further communications respecting the accompanying particulars, and it was stated by some observers who possessed little experience in the use of penthal that such disagreeable symptoms appeared during the administration (of penthal) that they were obliged to desist in its use.

Regarding the latter statements, I can only repeat what I have already said in my paper on ethyl bromid, read at the International Medical Congress at Berlin, 1890. I at that time described the dangerous accompanying and after-effects ascribed to ethyl bromid.

On the whole, it is remarkable that incomplete anesthesia and unfortunate accidents happened to those only who did not possess the least experience, whereas dentists who worked considerably with ethyl bromid obtained the best results.

It is not definitely settled whether the deaths said to be caused by the use of penthal can truly be attributed to the same. A case mentioned by Schirmer is worthy of notice.

As he was about preparing to administer penthal he noticed that the patient stared at him, and was so void of mobility and sensibility that he already resembled the picture of an anesthetized individual. Schirmer felt himself obliged to resort to artificial respiration, owing to the imperceptibility of the pulse to the touch, cold-sweat secretions, and weak respiration, with much enlarged pupils. This condition lasted twenty minutes.

If these symptoms had occurred during a penthal-narcosis, they certainly would have been ascribed to the anesthetic. Especially this case is very edifying from many points, much more so in the direction that before and during the administration of penthal great care and precaution must be exercised, and the respiration must be most particularly observed, because danger and trouble in a penthal-anesthesia may happen to the careless and inexperienced as well as in any other narcosis.

If I stated in my first communication that penthal, even in large doses, seems to be absolutely harmless, I did so under the supposition that I was speaking to professional men only. A narcotic absolutely free from danger does not exist; even such harmless materials as black coffee or pure water, rapidly drunk in large quantities, would not be without harm.

I should never speak to laymen of absolute freedom from harm in case of narcotics, and just as little would I, as is now the custom, express my opinion in a popular paper.

Since I have been using pental one year, and made about nine hundred narcoses, I can sum up and communicate my experience in the following brief sentences.

Of course my assertions refer only to minor operations, as I have never performed major surgical operations with the material.

1. Pental is an effectual anesthetic in all cases, and for that reason differs greatly from ethyl bromid, which in some cases is ineffectual.

2. Anesthesia is induced more slowly than with ethyl bromid, but lasts longer, and the patients only regain consciousness gradually.

3. The least excitement is extraordinarily rare. As yet, I have regarding the following results not observed any irritation of the stomach, nausea and vomiting, much less trembling, trismus, aphasia, etc.

4. Neither the heart's action nor inhalation is quickened during the administration; however, the pulse at times, especially in anemic individuals, is somewhat weaker, whereas in very excited people it is slightly accelerated.

5. Generally two or three c.cm. are sufficient for anesthesia in composed people. Ten c.cm. are adequate in most cases for the extraction of five to ten teeth.

6. Very excitable and strongly anemic patients, with a weak heart-action and an old bronchial catarrh, do not endure pental as well as healthy ones.

7. The best manner of administration is that with the Junker apparatus, the advantages being that the admission of the vapors into the lungs can be regulated, and that they are prevented from entering the eyes; also, that less is used, and the disagreeable odor for some people is not so noticeable. Professor v. Mering is at present trying through experiments to weaken the too quick effect of pental, and also to mask the disagreeable odor by the admixture of another preparation.

8. Anesthesia takes place in from one to three minutes.

Notwithstanding all these advantages of pental, I do not wish to assert that it may or can be administered less observantly than any other narcotic. All clothing about the neck, chest, and abdomen must be loosened, and the respiration continually watched by a physician or trained assistant. The dentist or surgeon cannot operate and at the same time, during the operation, observe dangerous symptoms.

Without doubt, at times unpleasant, as well as dangerous symptoms, may occur through the use of pental, as well as with all other narcotics; but whether occasioned by pental, peculiar dispositions of patients, or lack of precaution on part of the physician, and how the same may be avoided, can only be decided by observation and experience of different workers.

Pental is at present, on account of its sure effect and the wonderfully comfortable feeling of patients after anesthesia, the best narcotic for all operations of short duration.

CONGENITAL SYPHILITIC DEFORMITY OF THE TEETH.

BY DR. RICHARD OTTE.

(Translated by WILLIAM LOMBARDINO, D.M.D., Berlin, Germany, from the *Journal für Zahnheilkunde*, 1892.)

IN the year 1865, Jonathan Hutchinson, the English physician and syphilographer, published his observations in England on the deformities of the upper permanent central incisors, which he ascribed to the influence of syphilitic stomatitis as being a particularly important symptom of congenital syphilis having once existed in childhood. This view was disputed in Germany for a long time, and even to the present day some authors always look upon it skeptically; while French physicians, especially Alfred Fournier, are of the opinion that these so-called "Hutchinson teeth" are, perhaps without exception, noticed in inherited syphilis. I myself, as well as Chr. Bäumler, am a follower of the Hutchinson method, for which I contributed a small literary and instructive article to the *Berliner Wochenschrift*, 1887, No. 6. In reference to the above, I ask the publication of the following facts in this journal.

Opportunity for observing objectionless typical cases of Hutchinson's deformities is naturally very difficult, as perfect congenital syphilitic children generally die soon after birth or before the age of second dentition; so that useful material for critical judgment is comparatively scarce and at the disposal of very few physicians, to which may be added the fact that a period of eight to ten years is necessary for exact observation of single cases.

It actually happens in Germany that people who in their early childhood were troubled with *lues congenita* show characteristic pathological abnormalities of the above-mentioned incisors, but not in all such cases, and also not so typical as Hutchinson described regarding the same as to form, structure, and position. Mostly, however, the free edge of the poorly developed tooth appears saw-shaped, especially in the middle, so that the lower part is either worn off very early or crumbles away through slight mechanical influence. I have myself observed such condition only after preceding *lues congenita*, and do not share the still prevailing presumption that this deformity has nothing to do with syphilis, because it is found in perfectly healthy individuals. According to this, Bäumler's statement is correct, "that the above-mentioned German authors very likely never saw the affection in its typical form."

Moreover, stress may be laid upon the fact that there are some people who, on account of immediate specific treatment, recovered from their hereditary disease without any injury whatever to the organic system; consequently they appear quite healthy and normal to the physician, and are generally ignorant as to the state of their health during early childhood, also about which, when concerning syphilis, as can be readily understood, not even the nearest progenitors care to make a reliable statement.

Sometimes the former manifest syphilitic virus remains latent for about ten to twenty years.

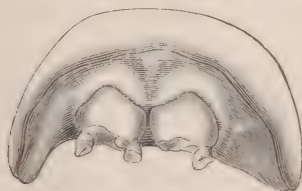
For this reason I mention the following characteristic case: About a year ago I accidentally observed in a young otherwise healthy laborer, nineteen years of age, of illegitimate birth, the characteristically formed Hutchinson teeth, existing since his tenth year, as represented

in the accompanying cut. This same person is at present—*i.e.*, in July, 1892—on account of ulcerating gumma-knots of both the lower thighs, in the Mariahilf Hospital under my treatment.

Accordingly the result proves that the causal connection of this deformity with syphilis is not far distant.

No doubt we have to deal with a pathological formation process, which appears so much more peculiar in that it is especially confined to the superior central incisors; consequently the constitutional influence of syphilitic poison is excluded.

Perhaps it is merely a question of local occurring disease which Hutchinson supposed to have been found in syphilitic stomatitis. The latter supposition seems hardly possible, since, apart from this, syphilis of the mucous membrane of the mouth is in very few cases of a highly destructive character, and the Hutchinson teeth were also found where previously only scabs in the corners of the mouth and



superficial stomatitis had been observed; so it remains entirely incomprehensible to me why the latter only has a morbid influence on the two superior central incisors, as, in fact, the rest of the teeth in no way present such specific affection. I find the explanation of the occurrence quite natural in a previous coryza syphilitica, which very often exists as the only sign of *lues congenita*, and begins with swelling of the mucous membrane of the nose, causing a copious slimy later pus and a thin watery discharge. This local disease-process occurs immediately above the delicate dental germ-sac of the two superior central incisors, as the nostril cavities are merely separated from these by a cartilaginous membrane. Since the ossification of these two teeth takes place in the first year of life, therefore the formation process is hemmed, or the pathological influence of structure not more than natural. The more intense and slower the coryza, the more apparent the deformity of the teeth, which in their characteristic form present a decidedly pathognomonic sign of syphilis hereditaria.

CONTRIBUTION TO THE STUDY OF GREEN TARTAR.

BY PROFESSOR R. HEIDÉ AND MR. CHARPENTIER, OF THE DENTAL SCHOOL OF PARIS.

(Translated from the *Revue Internationale d'Odontologie* for January, 1893.)

THE salivary concretions are composed of earthy salts and organic matter. Phosphate and carbonate of lime, and fibrin, are the principal elements of it; there also enters into the composition a small quantity of greasy matters. The relative proportions of these various elements differ with the consistence of the tartar and according to the individuals. We note four principal kinds of tartar:

1. Tartar soft, dry, and very tough, which is deposited around the necks of the teeth and never exists in large quantity.

2. Yellow tartar, which adheres strongly to the teeth; force is sometimes necessary to detach it.

3. Lightish yellow black, deposited at the gum-margin, especially on the exterior next the cheeks. This tartar disposes to caries the points where it is deposited. It is not tartar in the true acceptation of the word, but an infectious deposit, a fermentous medium, with permanent acid reaction (Viau).

4. Finally, green tartar, which, contrary to the other kinds of tartaric deposits, does not come from the salivary glands, but is produced by a parasite from the exterior,—the *Leptothrix buccalis* (Robin).

Robin, in his book, "On the Parasites of Man," had ranged the leptothrix among the algæ, but since then bacteriologists have placed it in the group of bacteria, order of *Leptothrichées*, characterized by filaments, curled or not.

The leptothrix has from 0.1 to 1 m. width, of a blue color when subjected to the action of the iodine, but is colorless itself. It may take various forms; its filaments have as much the aspect of short sticks as of micrococci. Injected into the conjunctival mucus it produces suppuration. It may enter into the larynx, trachea, and the bronchi of persons who have paralysis of the muscles of deglutition, in lunatics, and in those suffering from croup. It may result then in special inflammation of the bronchial extremities and gangrene of the lung (G. Sée, "Specific Non-Tuberculous Maladies of the Lung"). It is found in the spittle which comes from a gangrenous locality, and in the vagina, mixed with other micro-organisms. This micro-organism multiplies in the parts attacked, whence the necessity for removing it as much as possible.

Mr. Vignal has cultivated the leptothrix on peptonized gelatin.

The presence of green tartar on the teeth, besides its disagreeable appearance, has injurious effects on the enamel and easily leads to caries. It is important, therefore, to remove it from the teeth, but we know how difficult this is by the ordinary means. We use a process which has given very good results. It consists in rubbing the teeth with a mixture of equal parts of pulverized pumice-stone and tincture of iodine. The latter acts probably as a parasiticide. Whatever its action, the results we have obtained by this process are certainly superior to those of ordinary means. Mr. Charpentier has taken to the clinic of the school a series of observations of gingivitis with green tartar, where this mode of treatment has led to the rapid disappearance of the parasite, notably in several cases where, owing to the fragility of the teeth, it was not possible to use other mechanical means.

In cases where green tartar was particularly abundant, we have been obliged to repeat two or three times the cleaning with iodined pumice to remove it completely.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, January 10, 1893, at the New York Academy of Medicine; the president, Dr. William Carr, in the chair.

The executive committee, through Dr. W. W. Walker, its chairman, presented memorial resolutions on the death of Dr. John Allen, Dr. Miles H. Dodge, and Drs. L. M. Slocum, Sr., and L. M. Slocum, Jr., which were adopted by a standing vote. (See DENTAL COSMOS for February, 1893, page 160.)

The president introduced Dr. A. W. Harlan, of Chicago, Ill., who read a paper entitled "The Herbst Method of Treating Pulpes." *

Discussion.

Dr. C. F. W. Bödecker. You all remember when Dr. Herbst was in this country, and demonstrated his method of filling teeth. When at that time he spoke to me about this method of amputating pulps, I at once said to him, "This is the greatest quackery, the greatest bungling practice, the worst method, that could possibly be undertaken. Give it up." I showed him how we treat pulp-canals in this country. At that time Dr. Morey was in my office, and Dr. Herbst procured from him two or three sets of the Morey drills, and promised me to treat the pulp-canals in the manner I showed to him. Some time later, when he had returned to Europe, he wrote me that the treatment of pulp-canals was too tedious for him, and he thought he could get along much better in his own way. If I ever wrote a letter in strong language, it was one that I wrote him then. I never heard anything from Herbst about pulp-canals after that time. Up to this time, I have considered myself rather expert in treating pulp-canals, and I have taken as much care and trouble as any one could possibly take in opening pulp-canals and filling them perfectly. In an article which I wrote in 1884, I published how few failures I experienced under that method, and in this respect, as the essayist states quite rightly, there is hardly any need for improvement, at least in regard to the results. But when we come to the tedious process of extirpating pulps from the buccal roots of molars, or from wisdom-teeth, or from first bicuspid or the lower first molars, every one of us—I don't care who it is—will wish that he had some method of getting at the end of that root-canal other than by drills or broaches. I am sure every one of you, even the essayist himself, has had some of these canals that he could not get at. My object in bringing before our state society that paper on the Herbst method of treating pulps was this, and I distinctly stated it at the conclusion of that paper: "If we remove the pulps from those roots which we know can be prepared easily, and treat them in the manner we have been accustomed to, but amputate and cap the others, I am certain that most dental practitioners will have more success and pleasure in the treatment of pulpless teeth than heretofore." We all

* Printed in full on page 169 of the current number.

know that the lingual canal of a molar is readily accessible. I should never run the risk of treating a tooth with the other method, except for experimental purposes. I have treated fourteen of those cases, but none since then, because I want to wait until I remove some of them and see what the result is.

In all the pulp-canals I have treated since, I have removed whatever pulp-tissue could be removed, and filled. The essayist seems to labor under some misapprehension when he quotes me as saying that in the pulp-canals, where the roots are encysted, there is a great deal of septic matter. I should by no means expect any sepsis whatever if the pulp-cavity is closed and the end of the tooth is encysted, because it cannot possibly get in. If the pulp-canal is dry, this as a general rule shows that the dentinal canaliculi are closed too. I have examined several of those teeth, and have found the dentinal canaliculi closed, usually with secondary dentine, and we cannot expect anything better than that. Furthermore, the author of the paper states that the pulp is lingering with slow death, and then produces secondary dentine. Secondary dentine, every pathologist knows, requires an inflammatory condition of the pulp to produce it. New formations will never be produced under bad nutrition, but only in an inflamed condition of the pulp.

Dr. Carl Heitzmann. It is really with pleasure that I enter the discussion of such a witty and spirited paper as we have just heard. Being no dentist, I cannot talk about the practical part of this paper, but I can speak from my own observation about the results of researches of this matter since Dr. Bödecker brought the teeth to my laboratory for study. The essayist has not sufficiently separated the main points in this topic. He speaks of killing, again of weakening, and again of benumbing the pulp, in order to keep it alive, or, perhaps, to revitalize it. No one has claimed such a thing. The Herbst method aims to destroy the pulp in the crown, and to save and keep it alive in the roots. That is quite a different thing. I was notified by Dr. Bödecker of the subject for this evening, and that trouble was brewing, and, of course, I was ready to help him out of the mire; therefore we brought specimens to demonstrate what is claimed in Bödecker's paper. The destruction of the pulp in the crown is done by a metal, whose action upon the pulp is not quite understood; but as far as I can judge, and illustrate to you under the microscope, it is a process very much like mummification. It is not a caustic which is brought to bear upon the pulp-tissue at all. We can still recognize the elements of inflammation in the remnants of the pulp, but we see them deprived of life, devitalized. What is strange about such an assertion as that? The old Egyptians resorted to mummification by embalming upon a large scale to preserve dead tissue for thousands of years. It is plain that the cobalt must have aseptic properties, for I have failed to see living micro-organisms where it was used, although there are some clusters of them present, arisen during the process of pulpitis, killed evidently by the application of the cobalt.

All I can say is that the pulp is indeed destroyed,—not benumbed, as the essayist said, but really killed in an aseptic way. It is quite different with the pulps of the roots. They are alive. When I looked at the first specimens I was almost stunned myself, almost as

much as the essayist says the pulp is. It is hardly possible to believe that such a thing can be done—to kill the pulp in the crown and keep alive the pulp in the roots—and still it is positively the case. I prove it under this microscope. Here is the pulp of a root, treated with the Herbst method, that must have been inflamed, for it is transformed into fibrous connective tissue, and this means that the pulp is alive, although in a hyperplastic condition, still endowed with properties of life. A second and more interesting point is that such a pulp is able to produce new bony spiculæ, as proven by one of the specimens. We see imbedded in the fibrous tissue small particles of newly-formed bone, which proves that the pulp was alive at, and remained alive after, the operation. A still more conclusive point is that the pulp of the roots is able to produce secondary dentine, even though the pulp in the crown is destroyed. There we have specimens which prove our assertion, too. Here are three points which directly prove the life of the pulp in the roots, and now you will be surprised to look at a specimen here, with a power of 500, and see the dentine of the crown, treated with the Herbst method, alive. Only a comparatively narrow zone is dubious, possibly dead. But a little distance from it there are not only dentinal canaliculi, but also their tenants, stained with carmine perfectly. It means that the living pulp of the roots has sufficed to endow with properties of life the whole tooth up to the crown. To me that was the most interesting part of the examination. I cannot speak of the enamel, because we did not examine that; but as to the dentine, it was alive, and kept alive through the minute connections between the dentinal canaliculi first described by Dr. Bödecker fourteen years ago, and afterward proven by Dr. Hart and others.

The only way to explain this peculiar fact is to say that the vitality present in the pulps of the roots has sufficed to preserve the vitality not only of the dentinal fibers of the roots, but of the whole crown. I must say that after having examined hundreds of teeth under the microscope, I was simply surprised to look at the dentine of these teeth. I said, "If the Herbst method is worth anything, it is that it keeps the tooth alive." If you, with your old-fashioned methods, which have been used on some of my own teeth, killed the pulp, you killed the whole tooth; but with this new method, if you kill the pulp of the crown, you keep the rest of the tooth alive, and that seems to me of some value. The life of the tooth is not a trifling matter.

I was much amused by the remarks of the essayist as to the practical points. It seems to him to be too delicate an operation, and too much work. I should say that he is just the very man to do such a performance; if any one is fit for it, it is a Chicagoan. Every one will fail at first; you need not be afraid of destroying a few teeth, for you will have plenty of chances to succeed, and it is well worth the experiment to try the Herbst method. It is a fine operation, I judge, but it can be done, as has been proven by two teeth filled by Herbst. One of them is put upon this microscope with a power of 500, showing the pulp-chamber and live dentine; that is the crown. In the other specimen, with a comparatively low power, is shown the boundary zone between the dead and living pulp. The latter contains a spicula of bone, proving the life without doubt; and if you wish to see more specimens, they can be shown to you.

Dr. S. Freeman. I cannot speak of this matter scientifically ; but having met Dr. Herbst last summer, and he assuring me that his method proved successful, I tried the experiments in my office. Out of twenty teeth I only lost one, which was caused by pulpitis, induced by an irritant. I had to extract the tooth. There was neither soreness nor abscess in or about the other teeth. I do not find it necessary to cut them down, so as not to have them antagonize, as Dr. Harlan states. As far as the color is concerned, none of them have changed, to my knowledge.

The President. What class of teeth have you been treating?

Dr. Freeman. Teeth in healthy patients. They have been molars and bicuspid. I have not tried it in any of the anterior teeth.

Dr. Littig. Have you used arsenic for the same purpose?

Dr. Freeman. Yes ; I also amputated pulps without using any cobalt or arsenic, and had equal success. I used cocain first, and rely upon antiseptic treatment, and tin as a capping placed over the amputated pulp by the Herbst method.

Dr. M. L. Rhein. I personally feel very much indebted to the essayist for the admirable manner in which he presents to the profession a protest against the general adoption of a method of this kind, before we have any positive evidence as to whether it is entitled to a trial or not. It is a very worthy object for any man, especially any one as scientific as Dr. Bödecker, to give a method of this kind a thorough trial and experimentation ; but I thought it very premature on his part, as I mentioned at Albany last May, to present the paper that he did at that time. He should have waited. The sections from the two cases here represented under the microscope are not a sufficient test for us to form a basis of opinion on a subject of this kind. There is not a thing in the criticism of the paper of Dr. Bödecker by Dr. Harlan but that I believe the majority of the profession at present feel like indorsing. It is possible that in the end there may be something in the views expressed by Dr. Bödecker. But with our practical experience in the manner in which pulps act, our knowledge of the different ways in which we see the blood supply the pulps, the different standards of vitality as evidenced by the different cases that come under our notice in our practice, where it seems impossible to devitalize a pulp, the different constitutions of pulps that present themselves to the dental operator,—with all these facts patent to every observer, it is out of proportion for us to take two average microscopic specimens and on them assume a theory of practice.

Dr. Freeman states to us that he has met with as beneficial results without the use of the cobalt as he has with it, by simply amputating the pulps. If there is anything at all of novel merit in Dr. Herbst's claim, it is the empirical use of the cobalt, of which we know nothing. The conservative treatment of pulps by amputating the coronal portion is nothing new in dentistry. It is a very old, antiquated practice, that has been condemned by many men because of its uncertainty, not because there are not many teeth that you can amputate the coronal portion of the pulp, and have the pulp in the roots remain alive ; and perhaps if the circulation of that tooth is of sufficiently good character, it may produce a nourishment of the crown, as illustrated by the specimens under the microscope. The thing that mys-

tifies me in the case is that the cobalt seems to be inert, and does not have the effect which arsenious acid generally produces upon pulp-tissue. But granting all those circumstances to be true, it does not enable us to recommend a practice which we have heretofore condemned, as I said before, because of its uncertainty, for there are cases where, even though the root of the tooth may be encysted for years, we may have a pulp-canal without any septic matter in it of sufficient strength to cause an abscess; still a broken-down condition of that person's health, a weakened condition, or anything that may make trouble in the circulatory system, is liable to undermine the encystment of that tooth just as much from the pericemental portion as from within, and trouble then ensues. I have a number of cases, some of which I have published, which illustrate that, and it is a practical point which I have no doubt we are all acquainted with. Pulpless teeth that have been quiet for years have suddenly abscessed. It means that they were encysted for some years; that finally some weakened condition, a severe attack of some constitutional trouble, a febrile attack, or something of that kind, brought about the trouble which would have taken place originally had there been no encystment. This danger alone prevents us from practicing such a method with no better aid to rely on than these two specimens.

There was, however, one point in the opening remarks of the essayist that I wish to take exception to. He states that in the sixty odd years that arsenious acid has been used for the devitalization of pulps we have found no method as safe or as practical as this. It is about four or five years since I have used any arsenious acid for the devitalization of pulps, and during that time I have removed more living pulps in the same amount of time than I did before; and under no circumstances could I allow myself to return to the practice of using anything as irritating as arsenious acid is, and that has the possibility of producing the pericemental troubles which I have seen produced by the irritating influence of arsenious acid in my own practice, and that have come under my observation by consultation with other parties. We have many records of the great extent of this pericemental irritation; the pain alone is a point that we must carefully consider. Even after the extraction of the tooth, we see no effects of the arsenious acid except that fearful neuralgic pain which it has so often produced. My treatment of these cases is one that I do not wish to mention any further than to state that it has been published, and consists entirely of the use of the methyl chlorid and cocain hydrochlorid in combination, and the removal of the pulp without devitalizing it, and without the patient suffering anything, without that pain which the arsenious acid itself must produce, even for a short time, in some cases. When I say without pain, I mean, of course, with the exception of perhaps a second or so of sensation. After that the patient experiences no sensation during the entire operation of removing the pulp. Since the essayist brought this up as a historical point in his paper, I merely wanted to controvert the statement that we have to-day nothing better than arsenious acid for getting rid of living pulps that we desire to remove.

Dr. Freeman. Has Dr. Rhein ever had general anesthesia in the extraction of the pulps by his method?

Dr. Rhein. No, sir.

Dr. F. Milton Smith. If I understood Dr. Bödecker correctly, he said he would not, in any event, pursue this treatment with the palatal root of the molars.

Dr. Bödecker. Yes. I will give my reason for it. I have had but little experience, and I make this method public for the reason that I want all of the dentists to practice it as much as they can, as I said in my paper at Albany. You can experiment on sixth-year molars which have to be extracted afterward. If every one would do that, we would soon get at some positive facts and results. I fill the palatal canals of upper molars for the reason that I do not feel positive, and do not like to experiment on my patients. It is an experiment, I must admit; but if it is a sixth-year molar, which I intend to extract afterward, I do it anyway, for the purpose of experimenting. I would have to remove the molar anyway, for the child is suffering, and at the same time I get the benefit of the experiment for the profession.

Dr. Smith. My reason for asking the question was this. In the roots of molars that I can get at conveniently to remove the pulp and fill the roots thoroughly, I do not find any difficulty at all after treatment, and where the root is so small (as in the buccal roots) that I cannot get a fine nerve-broach in, if there is a little particle of live pulp there, I have repeatedly filled the root not more than half-way up, with as large a percentage of success as in cases where I have had the pulp entirely devitalized. Is it in these small roots that this treatment is used, or in the large ones? If it were used in the palatal root and succeeded as well, I should think differently.

Dr. A. L. Northrop. Professor Heitzmann referred to one specimen he has there, where this method of treatment with cobalt had been used and afterward secondary dentine had been formed. I would like to ask him how he arrives at his conclusions so perfectly, and knows that that dentine was formed after the application of cobalt. What evidence has he that it was not there before any treatment of the kind was made?

Dr. Heitzmann. Dr. Bödecker remarked that it takes a good deal of irritation of the pulp to produce secondary dentine. Please keep in memory that the pulp is dead in the crown, and cannot produce any dentine. The aspect of this secondary dentine is of the kind that I, from my experience, can say is of recent date. I cannot enter into details, which would be interesting, but the heavy mass almost obstructing the pulp-chambers induces me to maintain positively that it is the outcome of the irritation produced by cobalt.

Dr. Northrop. We have in some teeth pulp-stones or secondary dentine that have never troubled the patient until the pulp has become exposed by caries, and then when we remove the pulp we sometimes find the pulp-canal two-thirds filled with secondary dentine. If these cases had been treated with cobalt, and afterward we found secondary dentine in the roots of the teeth, I do not see why we would not come to the same conclusion that we do now. If the use of cobalt reduces the life of the pulp, then there would not appear to be sufficient vitality left (for Dr. Heitzmann claims it needs the best nutrition) to give us this secondary dentine. It would seem, when you have destroyed the coronal portion of the pulp, that nutrition is already impaired. I do not see where the necessary activity and life can

come from to form the secondary dentine, taking their view of it. Cobalt has been used for more than thirty years. Dr. Crane used it entirely in the place of arsenic to destroy the pulps of teeth. If it will completely destroy pulps, how can we determine the exact quantity of cobalt to use, and just how long to leave it in a tooth when a limited destruction of the pulp is desired? What is there to stop the devitalizing process after it is set in motion?

Dr. Heitzmann. Dr. Northrop remarked that pulp-stones may arise without the patient noticing it; but does that exclude an irritation present? We know that the so-called pulp-stones are formations of secondary dentine of the utmost perfection, which grow very slowly and arrive at a considerable size. There we have stratified secondary dentine, layer after layer, solidified in a high degree, with beautiful radiating canaliculi. Quite different is the secondary dentine that is on exhibition here; it is the form in which there is a great variety of large-sized dentinal canaliculi, running irregularly in all directions, with comparatively scanty basis-substance. We know that this form is of a rapid growth. In regard to the other question—how much cobalt should be applied—this is a practical point, and I cannot answer it.

Dr. Northrop. I would like to continue this just a little further. In using cobalt upon a pulp in its normal condition, where there is a perfect circulation of blood and nerve current, when the mass of pulp in the crown of the tooth is destroyed, the circulation of blood and nerve current is certainly destroyed; and that must be healed or restored in some way to get the regular circulation before any secondary dentine can be formed; and I cannot see yet that Professor Heitzmann makes that clear to us, so we may dare to dabble with it. I cannot see where there is a ghost of a chance. We may have angels' visits once in a while, where the pulps remain alive, but generally we have so much neuralgia that we have to get rid of them. Professor Heitzmann presents the matter in a plausible way, and shows us these specimens; but with as little life as there is left in these teeth I cannot see where he gets the secondary dentine.

Dr. Heitzmann. It is just the expression "little life" which is a mistake. On the contrary, there is plenty of life present in the remnants of the pulp of the roots, sufficient, indeed, to supply with life the dentine of the whole tooth.

Dr. S. C. G. Watkins. Dr. Northrop anticipated the questions which I was rising to ask, and made the speech which I intended to make. There is still another question, however. Dr. Heitzmann spoke of the pulp which is left in that canal, showing the spicula of bone. That is something we see frequently in cases where there is considerable inflammation, which is caused probably by irritation of some kind. We not only find pulp-stones, but also the spiculæ of bone which he describes there, sometimes to such an extent that almost the entire pulp is in a bony formation. I would like to ask Dr. Heitzmann how he can reason out anything which will convince us why that bone was formed after the main body of the pulp was destroyed, instead of a short period previous to the destruction of the pulp. He stated it was of a recent growth. It seems to me that it would be impossible for the doctor to tell by the microscope whether that bone was formed immediately before the death of the

body of the pulp or soon after. In either case it would be of recent origin. Then, again, the bone remaining in the pulp, and finding it alive : it seems to me that this is another point which ought to be brought out. Where this bone is found in the pulp, in most cases it is almost impossible to destroy it by the use of arsenic. Sometimes we must make half a dozen applications before we can devitalize it. Why is it that in that particular case they give the credit to cobalt, when in most cases it is almost impossible to kill them?

Dr. Heitzmann. I can help you a little. I said in my previous remarks that a fibrous pulp was the outcome of an intense irritation. Whenever we see fibrous pulp, we know that at one time it must have been inflamed, although never suppurating. It is a new tissue, that is formed out of normal myxomatous pulp-tissue, that we call fibrous, and I can assure Dr. Watkins that we never find bony spiculæ of bone except in fibrous pulps. Now we approach the question, How can I make the statement that this fibrous pulp and the formation of bone is the result of cobalt? We microscopists have positive signs of a newly-formed bone-tissue, for we know that when bone is recently formed the bone-corpuscles are much larger and much more irregular than in a slowly developed old bone. This is the case here, and that induces me to say that it is of recent date. Still I admit the possibility that the production of fibrous pulp may have occurred some time before the application of the cobalt.

Dr. Louis Ottofy. It appears to me in this discussion that cobalt evidently has certain properties which were not hitherto known. I have heard that cobalt could be used for the destruction of the pulp much like arsenic. According to Dr. Herbst, the cobalt seems to have a self-limiting property. Why it should destroy the contents of the vascular portion of the pulp and not the less resisting portion in the root-canal, is a very queer thing to me. I cannot see why it would stop at the opening of the root-canal in its action. Another point that is peculiar to me, and in which I regret that my knowledge of microscopy is not more thorough, is this : I understand from Dr. Heitzmann that he can tell under the microscope the difference between the living and the dead tissue. He can tell, although he received that specimen when it was dead, that that specimen was living. If it is plain that that pulp was living, I would like to know how he can tell whether it was living or dead when extracted. I am very willing, oftentimes, to take up things in practice that seem very unscientific. I do not believe that it is necessary for a subject to be scientific in order that we should practice it ; often practice has made science, and I believe I was not wrong in following the example of so great a man as Abraham Lincoln, who, when he was asked if he had to sacrifice something, what it would be, answered, " My wife's relations."

Relative to arsenic, I thought, while it was very slovenly to put arsenic into a tooth and then fill the tooth without removing the dead pulp,—while I considered it very slovenly, I thought I could use some of my wife's relations to try it on. About five years ago I filled seven teeth in the following manner : These were teeth where it did not make much difference whether they were taken out or not. They were difficult to fill, and the patient was unwilling to have it done. I placed upon a piece of paper, without cleaning out the

cavity except at the margin, the well-known quantity of arsenious acid expressed by the size of a pin-head. I placed that over the pulp, put cement and amalgam over it, and that was all. From week to week I have seen the teeth. I will exhibit them to any dentist in Chicago, and if they can tell any difference between those teeth and any of the teeth that are filled, I will do anything for them. The teeth are in absolutely good condition; they have never been sore or in anyway different from any teeth that are filled. That was very unscientific, and I have not done it since that time. If I admitted to any one that I did it, I would probably be condemned for it. One of these teeth will have to be extracted. The lady is wearing a plate, and has been anxious to have the teeth out for a long time. When I take that tooth out, I shall be happy to give it to Dr. Heitzmann. I will give him the exact time when it was filled, and I should like to know if that pulp has been living all this time.

Dr. Heitzmann. Hundreds of dentists have studied in my laboratory, but the gentleman who has just spoken has not been among them. If he had studied with me, he would not have asked how we distinguish living from dead teeth. We have a very simple test in the ammoniacal carmine stain. A dead tooth, or dead portions of the tooth, such as the remnants of the pulp of the crown in our case, and the zone of dentine bordering the pulp-chamber, will never assume our carmine stain. We have several other proofs, of course.

Dr. Harlan. You may perhaps remember that seven years ago I was to have read a paper before another society reviewing the uncalled-for and unscientific deductions of Dr. Sexton, but I was detained by a snow-storm, and although my paper was never read, it was published in the DENTAL COSMOS. To-night I have fulfilled my promise to be with you, and after having listened to all of the remarks made by the various speakers, I do not see but that the field belongs to me.

Dr. Bödecker says I am a bad pathologist, but I have a very high authority for the expression I make in my paper. It was made in connection with the discussion of the original paper. I did not deny—and who can deny?—that the application of cobalt does not produce an irritation of the pulp sufficiently great to cause the formation of secondary dentine. Has not that been the trend of the discussion this evening? Did I say anything other than that in my paper? I think not. How will you produce mummification of the living part of an organ, leaving two-thirds of it alive? That is one of the strange things I did not understand. Dr. Heitzmann said that mummification had been handed down to us from a time antedating the Egyptians. But how will you mummify something that is alive? Dr. Heitzmann also said that one of the main points in my paper was that I thought it required too great skill to perform the operations according to the Herbst method of treating pulps. I think it requires much greater skill to treat a tooth by first destroying a pulp and then removing it. The point I objected to was that, according to the diagram presented by Dr. Bödecker, there was no connection between the pulp-stumps. I have it here before me. In the discussion he stated that Herbst said that the greatest number of failures that he found was due to the fact that he had cut the bulbous portion of the pulp down to the bifurcation. The point I made was that that theory was exceedingly delicate and hair-splitting.

I have been more than gratified at the interest that you have shown, not only by carefully listening to the paper, but to all the speakers, and I think, while I am on the floor, I will speak of another matter that I came here for. I want to say now that the greatest opportunity of your life is before you. In this year of 1893 you will have the privilege of attending the greatest scientific convocation of dentists that the world has ever seen, in the city of Chicago. In connection with the officials of the World's Columbian Exposition, all the members of the dental profession in the city of Chicago, in the state of Illinois, and of the whole Northwest are making preparations to entertain as best they can those gentlemen and representatives of our profession residing in other portions of the country. I desire now to say that the executive committee, of which the chairman of the executive committee of this society is the honored head, have been at work for more than two years preparing for this great event in the history of dentistry, and that it is expected from the careful deliberations of that committee of fifteen that there will be assembled in Chicago, about the middle of August of this year, dentists from every clime. We have letters from China, Japan, Sandwich Islands, Peru, Chili, Argentine Republic, the West Indies,—everywhere. To-day I received a letter from France, our sister republic, and they say they are all coming, coming with one accord, to participate in this event, which will long be remembered. I hope you will all be present.

On motion of Dr. Walker, the society tendered to Dr. Harlan a very generous vote of thanks for his able and interesting paper.

Adjourned.

B. C. NASH, *Secretary*.

CHICAGO DENTAL CLUB.

At the regular meeting of the Chicago Dental Club, held November 28, 1892, Dr. C. T. Gramm, of Keokuk, Iowa, read a paper entitled "Electricity in Root-Filling," which is printed in full on page 208 of the current number.

Discussion.

Dr. Eugene S. Talbot. You say, Dr. Gramm, that capillary attraction is had to so great an extent by the heating of the copper wire that the wax will run to the end of the root. Is that the idea?

Dr. Gramm. Yes, sir.

Dr. Talbot. Will it do the same thing in the upper jaw?

Dr. Gramm. Yes; because the capillary attraction is greater, and exceeding narrowness of a canal will increase the attraction. The finer the tube inserted in water, the higher the water will rise inside the tube.

Dr. Talbot. Will not the heat draw the wax back toward the cavity?

Dr. Gramm. No. It is not the heat that causes the attraction. Heat will advance and increase the breaking up, scattering, or dispersion of the molecules; but once in position, it would be difficult to overcome the effect of capillarity by that of gravitation, and the

heat being removed, you would have a fixation of the wax so rapidly that there would be little danger.

Dr. Talbot. Whose battery do you use?

Dr. Gramm. I use a 25-ampere storage battery, made by McIntosh, costing about thirty to thirty-five dollars.

Dr. G. W. Haskins. The method devised by Dr. Gramm overcomes one difficulty. In practice we find many tortuous canals in which it is difficult to insert a broach, and we are successful only after many trials. To repeat this as often as necessary to dry the canal becomes exceedingly tedious. With this method a broach can be inserted, and, while *in situ*, heated as often as required, thus obviating the necessity of removal and reinsertion.

Dr. E. A. Royce. I am obliged to the essayist for some good points. The difficulty that I have found with electric root-driers is that of getting a point that would endure, and that could be placed conveniently in the canals. The point made by Dr. Haskins is a good one. The diffusing of the eucalyptus is also a good point. The remarks about the storage battery were particularly interesting to me, as I have used one for two years with great satisfaction. I find it somewhat more expensive than the street current, but it gives me all the power I want, and a good current for my mallet.

Dr. E. L. Clifford. It seems a pity to let a practical subject like this pass without further discussion. Whenever we get hold of a practical paper that brings up points in our every-day practice, like the one that has been read by Dr. Gramm, it is refreshing. It is like the dessert after an immensely large dinner.

You will remember that about three years ago I read a paper before the Chicago Dental Society on the "Preparation of Root-Canals and their Filling at One Sitting." Many of the points made at that time were to a great extent similar to some of those made in Dr. Gramm's paper this evening, and it seems to me will go far, and, in fact, help to prove to each and every one of us that we can prepare these canals better in one hour than we can in twenty; that we have been overtreating the root-canal; that we have been depending upon medicines and our theories to do a great deal that we could have done by mechanical skill and force. We should take advantage of physical laws, remembering that they are laws that cannot be broken. Nature abhors a vacuum, and will do everything to fill it up.

We know from our studies that it is absolutely necessary for the maintenance of micro-organic life to have three factors. We must have a proper temperature, moisture, and pre-existing micro-organisms. We might say four things. We must have suitable media upon which these micro-organisms can live and flourish. It is not necessary to destroy all these elements in order to break up the future growth of these micro-organisms. If we can destroy any one of them we render the spot or locality aseptic for all time, provided we can maintain that condition. I have held that there is only one thing to deter us from filling a root-canal: that is the impossibility of drying it. Sometimes, you all know from experience, we will have a discharge of muco-purulent character, or after we have extracted a pulp there will be a hemorrhage we cannot readily control, or which will take us longer to control than the time is worth; consequently it is better to make a dressing to the canal, dismiss the patient, and await

nature's coming to our rescue. If the tooth is sore it would be cruel to work on it, in which case I would prefer to have another sitting. With that exception, I think we can fill these canals just as well in the one sitting as in the many. Another point made in the paper is the tendency toward what we might term, in our dental specialty, monopharmacy,—a desire to depend upon one medicine. One medicine of the right kind and properly used is really all we want, if we can get any one thing that will answer the purpose. In the past we have indulged in "shot-gun" prescriptions, in the hope that if one thing missed the other would hit; and if we succeeded we did not know which to lay the credit to, and if we failed we did not know where to attach the blame.

I take issue with his preparation of eucalyptus. I do not believe the ordinary preparation we get at the pharmacy is fit to use in anybody's teeth. If we use eucalyptol we have an agent that is more penetrating, powerful, and clean, and certainly of a much more pleasant odor. If we could get the oil of eucalyptus which is made by Sanders & Sons, of Australia, it would be the thing for us to use. As you well know, there are thirty or forty different species of eucalyptus. There are four special ones that are used, and Dr. Black has shown from some bacteriological experiments he has made that the power of eucalyptol is certainly greater than the oil of eucalyptus; in fact, oil of eucalyptus appears on a par with almost all the other antiseptics that have been experimented with. We know also from our researches that a good many of our antiseptic theories have been overstated. We have learned from them that it is not necessary in order to kill a micro-organism to put salt on its tail or strike it in the head. If we remove any one of the four elements that are absolutely necessary for its growth, we can prevent its future growth. The day of rational therapeutics has not arrived, and we cannot throw away our empirical methods simply because we do not know how they act. If we did, we would not put arsenic in a tooth to-day. We do not know how it kills a pulp. The *rationale* of its action has never been demonstrated sufficiently so that the majority of the profession could accept it. In order that he may be doubly sure, the operator floods his cavities with chloroform or ether prior to the application of these oils. As the doctor says, there may be some extraneous matter there that abounds in the oils and fats that heat does not mummify. These oils and fats are freed and absorbed to a great extent by the tubuli of the teeth. With ether we can dissolve the oils and fats. With chloroform we can place the surrounding tissues contiguous to the parts in an anesthetic condition; consequently we can make these operations much less painful. Eucalyptus or eucalyptol, or any other agent, will mummify with the assistance of heat, and I believe, as I said two or three years ago, that when the apical foramen is thoroughly sealed with an indestructible substance, freedom from future trouble is just as sure as if you had extracted the tooth.

Dr. Talbot. This is undoubtedly one of the improvements in dentistry, and seems to be the most rational way of treating and filling roots that I have heard of in the last twenty years.

When I first commenced to practice dentistry, the mode of filling roots was by the use of oxychlorid of zinc, and there were good reasons for using it. When a pulp was destroyed and it was sup-

posed to be removed, there was a certain amount of material left in the canal. It was almost impossible to remove it all. The reason the oxychlorid of zinc was used was this: that the chlorid of zinc when placed in the cavity of a pulp-canal would mummify the tissues. It would prevent putrefaction. After the root was saturated with chlorid of zinc, it was filled with oxychlorid of zinc and made solid. There were two methods used in that treatment of this canal, one chemical and the other mechanical. After that, some one brought up the scheme of filling roots with chloroform and gutta-percha, the most nonsensical thing ever used in treating root-canals, according to my notion, yet the largest percentage of dentists use that mode of filling roots to-day. There is nothing in the chloroform or gutta-percha that will produce an antiseptic condition or destroy the albumin in the pulp-canal, and so it is purely a mechanical mode of filling the root. For twenty years I have watched this mode of filling in patients that have come under my care. I have frequently removed those fillings, and invariably within six months could smell the sulfuretted hydrogen upon that material. You can't do that with oxychlorid of zinc. It is not possible for the reason that the chlorid of zinc has destroyed the material to such an extent that putrefaction cannot take place. Now, then, we have to-night a plan which to my notion is superior to both of these modes of treatment. In the first place, the use of the actual cautery, which is not new, and which was first introduced by one of our old members, Dr. Woolley. The only objection to his apparatus was the fact that we could not keep the end of the needle hot enough to destroy the animal matter which might remain in the canal. If Dr. Gramm is able to do that, which he says he is, he has done more than could be done with chlorid of zinc. He is able to mummify or coagulate the albumin in the canal so that putrefaction cannot take place. Now there comes up a little point which our secretary (Dr. Clifford) has talked about. We do not require the use of medicine in a case of that kind; eucalyptus, chloroform, or ether are not necessary, because the material has been destroyed, and all that is essential is the use of wax or paraffin, which I think would be better. Paraffin will so fill the canal that putrefaction is impossible, and then, by driving a little instrument of copper tightly into the canal, it seems to me to be the most reasonable, sensible thing that I have heard of since I have been practicing dentistry.

Dr. Haskins. A condition which has not been mentioned, and it falls to all of us, is a certain amount of soreness after root-filling. With this method I think it could be avoided. In our anxiety to thoroughly fill the root, we may force a portion of the fluid gutta-percha beyond the apex. If this does occur, I find in my own practice that I have teeth remaining sensitive to pressure for some time after the root-filling, and this soreness continues until nature has provided a space at the apex by absorption of sufficient bone to accommodate the excess of gutta-percha. In the method before us, unless the broach itself passed beyond the apex of the root-canal, there would be no traumatism and little or no soreness after root-filling.

I would suggest to the essayist the advisability of employing an eighteen-carat gold broach in preference to copper. I think its heat-conducting properties would prove all that could be desired.

E. L. CLIFFORD, *Secretary*.

ST. LOUIS DENTAL SOCIETY.

THE annual meeting of the St. Louis Dental Society was held at the office of Dr. J. B. Vernon, January 3, 1893. The following officers were elected for the ensuing year: Dr. De Courcy Lindsley, president; Dr. J. Warren Wick, vice-president; Dr. William Conrad, corresponding secretary; Dr. J. G. Pfaff, recording secretary; Dr. Henry Fisher, treasurer. Dr. L. A. Young, Dr. P. H. Isloeffel, Dr. C. L. Pepperling, committee on publication; Dr. H. M. Baird, Dr. A. J. Prosser, Dr. M. C. McNamara, committee on ethics; Dr. W. N. Morrison, Dr. C. L. Hickman, Dr. J. H. Spalding, committee on membership.

TACOMA DENTAL SOCIETY.

THE Tacoma Dental Society has elected the following officers for the ensuing year: Dr. M. C. Burns, president; Dr. A. J. Gustaveson, vice-president; Dr. H. L. Hedger, treasurer; Dr. W. E. Burkhart, secretary, 930 Pacific avenue.

DENTAL SOCIETY ANNOUNCEMENTS.

NORTHERN OHIO DENTAL ASSOCIATION.

THE thirty-fourth annual meeting of the Northern Ohio Dental Association will be held in Akron, Ohio, May 9, 10, and 11, 1893. Papers will be read by Drs. Geo. H. Wilson, Cleveland; D. A. Allen, Toledo; L. P. Bethel, Kent; F. S. Whitslar, Youngstown; L. L. Barber, Toledo; Corydon Palmer, Warren; W. T. Jackman, Cleveland; S. B. Dewey, Cleveland; J. F. Stephan, Cleveland; J. R. Owens, Cleveland; and E. J. Wayne, Sandusky; together with interesting clinics.

Members of the profession are cordially invited to attend.

L. P. BETHEL, *Secretary*, Kent, Ohio.

MISSISSIPPI VALLEY DENTAL SOCIETY.

THE president and executive committee of the Mississippi Valley Dental Society have, after consulting with the active members of the association, decided to postpone the meeting for this year. Owing to the many other prominent meetings following closely after the one of the Mississippi Valley Dental Society, the interest of the profession in this vicinity seems to have been diverted and centered on these other meetings, as was shown by the rather meager number of papers secured by the executive committee; and it is with the hope that by next year, with nothing to divert the attention of the members, we would by presenting an excellent program arouse their enthusiasm and have an old-time meeting again.

O. N. HEISE, *President*.

VERMONT STATE DENTAL SOCIETY.

THE next annual meeting of the Vermont State Dental Society will be held at the Welden House, St. Albans, March 15-17, 1893.

A cordial invitation is extended to all members of the profession.

THOS. MOUND, *Secretary*, Rutland, Vt.

GEORGIA STATE DENTAL SOCIETY.

THE Georgia State Dental Society will hold its regular annual meeting in Atlanta, commencing May 9, 1893, and continuing four days. The profession, one and all, are cordially invited to be present.

S. M. ROACH, *President*.

L. D. CARPENTER, *Secretary*,

47½ Whitehall st., Atlanta, Ga.

ALUMNI SOCIETY, PHILADELPHIA DENTAL COLLEGE.

THE annual meeting of the Alumni Society of the Philadelphia Dental College will be held at the college building, Wednesday, March 8, 1893, at three o'clock P.M. All graduates of the college are invited.

L. GREENBAUM, *Secretary*.

NORTH CAROLINA STATE DENTAL SOCIETY.

THE annual meeting of the North Carolina State Dental Society will be held in Raleigh, May 23 to 26, 1893. An attractive program has been arranged, and it is hoped and expected there will be a large attendance.

The standing committees for 1893 are as follows, the first-named in each case being the chairman:

Dental Education.—Drs. J. E. Freeland, J. H. White, W. P. Moore, A. O'Daniel, W. W. Rowe, C. S. Boyette.

Dental Chemistry and Metallurgy.—Drs. I. N. Carr, E. J. Tucker, R. W. Reece, P. E. Hines, A. J. Pringle, C. W. Banner.

Dental Pathology.—Drs. J. H. Durham, A. C. Liverman, L. B. Henderson, D. L. James, F. C. Frazier, R. P. Anderson.

Dental Therapeutics.—Drs. S. P. Hilliard, H. Snell, H. V. Horton, J. M. Ayer, V. J. Burgin, J. A. Blum.

Operative Dentistry.—Drs. J. E. Matthews, J. E. Wyche, J. M. Riley, E. K. Wright, G. W. Whitsett.

Prosthetic Dentistry, including Crown- and Bridge-Work.—Drs. N. M. Culbreth, T. M. Hunter, W. J. Conrad, J. H. London, C. L. Alexander.

Orthodontia.—Drs. J. F. Griffith, V. E. Turner, H. C. Pitts, E. E. Murray, Luther White, C. W. Bradsher.

Oral Surgery.—Drs. W. H. Hoffman, A. M. Baldwin, J. N. Hester, J. A. Ballentine, T. W. Harris, W. H. Edwards.

Materials and Appliances.—Drs. J. W. Holt, C. J. Watkins, J. B. Little, J. A. Hurdle, R. L. Ramsay, J. C. Goodwin.

Dental Prophylaxis.—Drs. J. F. Ramsay, William Lynch, J. M. Parker, R. M. Morrow, G. B. Patterson, S. W. Gregory.

Anatomy and Physiology.—Drs. C. A. Rominger, J. H. Benton, J. S. Spurgeon, Frank Boyette, W. B. Murphy, H. D. Harper.

J. E. WYCHE, *Secretary*, Oxford, N. C.

ST. LOUIS DENTAL SOCIETY.

THE St. Louis Dental Society will hold a three-days' clinic, March 15, 16, and 17, 1893. A general invitation is given for all dentists to attend. The committee having charge of clinic already promise an interesting meeting. Drs. A. H. Fuller, J. Warren Wick, and W. M. Bartlett compose the committee.

WM. CONRAD, *Corresponding Secretary*, 321 N. Grand ave.

EDITORIAL.

THE WORLD'S COLUMBIAN DENTAL CONGRESS.

THE Executive Committee of the World's Columbian Dental Congress has issued the official "Prospectus," which covers forty-four pages and embraces lists giving the entire personnel of the organization, including the officers and members of the several committees, with their addresses and respective functions. The constitution and a codified set of the rules governing the work of the organization and of the committees are added, together with much other valuable information. The results as set forth in the prospectus give evidence of the earnest faithfulness with which those in charge of it have performed their labors, and the catholic and impartial spirit which has animated them is easily discernible in the selection of representative men in dentistry throughout the world, giving a truly international character to the Congress.

In such an undertaking it is impossible that every appointment made should be above criticism, but in the present instance the manifest desire of the Executive Committee to secure a result which shall meet a general approval from the dental profession throughout the world should secure the indulgence of any who may be inclined to cavil at what, under the circumstances, ought to be regarded as unavoidable errors.

We note an important typographical error which occurs in the prospectus, and which also appeared in the previous list of officers published in the DENTAL COSMOS for January, as follows: The name of the Honorary President for Germany appears incorrectly. It should be Dr. Robert Carl Franz Baume, Oranienburgerstrasse 58, Berlin, N., Germany.

The work of the several committees is progressing favorably and rapidly. The character of the essays which have been promised by leading men is such as to guarantee the high scientific phase of the work. Over thirty of the most prominent investigators and writers in

the dental profession in various parts of the world have announced their intention to be present and read original essays prepared especially for the Congress. Their names, with the subjects of their papers, will be published at an early date, as soon as the list is completed. Those who desire to present papers before the Congress should announce their intention to the chairman of the Committee on Essays without delay, giving the titles of their papers, to avoid confusion in the work of the program committee at the last moment.

ORAL HYGIENE.

THE routine work of ordinary dental practice consists so largely of efforts directed toward the repair and replacement of teeth which are partially or wholly destroyed through caries, or by the inflammatory conditions affecting the pericemental membrane, that the prophylaxis of the oral tissues and teeth is apt to receive but a half-hearted consideration, or may be omitted altogether, unless special advice and counsel is sought in this direction by the patient. The subject has not received the full treatment in dental periodical literature that its importance demands, and no line of research would in all probability yield more important results, if undertaken by competent observers and investigators. Much has been said about the importance of oral hygiene, and in general the truthfulness of these statements has been accepted. It is freely conceded that the mouth and teeth should be kept clean and free from deposits; that neglect of care in this direction entails damage to the dental organs and soft tissues of the mouth, and ultimately to the general health. But such advice is given usually from the cosmetic standpoint, in much the same way that the advice is given to a child to wash its face on rising in the morning. The dental practitioner when he has removed deposits, filled and treated such teeth as needed it, usually dismisses his patient with some general directions as to the use of brush, dentifrices, and floss silk, he perhaps advises the use of some wash of questionable antiseptic value, and considers that his duty has been fully performed. But even when such directions are faithfully carried out, the patient may return in six months with a surprisingly large number of new cavities of decay or renewed activity in pyorrhea cases. It becomes evident that the personal hygienic care which has been employed by the patient has fallen far short of its object as a prophylactic measure against a recurrence of the dental troubles for which he in the first instance sought relief. Must we admit that our efforts in this direction have reached their limits of possible efficiency? Have we, in the light

of all that has been done in the etiology of dental and oral diseases, with their immense suggestiveness as to the lines along which we may hope for a scientific prophylactic treatment, done all that we can do, all that may be rightfully expected of us toward preventing the continued recurrence of these disorders?

We are prone to congratulate ourselves upon our rapid advancement as a profession, to point with pride to the results of the solid scientific work upon which we found our claims to distinction and recognition, and there are not wanting numerous instances where the relative rates of advancement along scientific lines made in medicine and dentistry respectively are compared by dental writers and speakers to the disparagement of the former; but let us not forget that the results of bacteriological research in medicine have long ago placed the etiology of many important diseases, especially of the more virulent and fatal forms, beyond the point of reasonable conjecture, just as in dentistry the etiology of caries has been; and that the trend of bacterial pathology, so far as it relates to medicine, is now toward the solution of the problem of prophylaxis in those disorders whose etiology has been definitely determined. The first and most important discovery in this line of scientific prophylaxis, which culminated in the production of Koch's tuberculin, while it fell short of its high ideal, yet contained a generic principle which is being steadily developed in relation to the more important and grave disorders of bacterial origin that promises positive and satisfactory results, so that the successful antidotal and prophylactic treatment of many serious and fatal diseases seems to be reasonably assured as forthcoming. Are we to be outdone in our own special field? Can we afford to wait until some member of the medical profession has cut for us the Gordian knot of the successful prophylaxis of dental caries, for instance? The inflammatory conditions of the soft tissues of the mouth offer a fruitful field for research. The recent epidemics of *la grippe* produced disturbances of the oral mucous membrane and soft tissues which are in such constant association with this disorder as to be almost pathognomonic, and successful treatment of the general disorder demands a thorough and continued sterilization of the mouth, if recurrences are to be avoided. It is reasonable to believe that the specific germ of *la grippe*, as is the case with most pathogenic germs, finds its entrance into the organism through the mouth and air-passages, and meets with a suitable culture-field in the oral cavity, from which point diffusion takes place, resulting in the general toxic infection. The systematic mechanical cleansing of the teeth, and particularly the removal of the thick coating or fur from the dorsum of the tongue, and afterward sterilization by a neutral or alkaline solution of hydrogen peroxid, greatly alleviates the intensity of the attack, and tends to prevent its

recurrence. The good results obtained in the case of *la grippe* by a thorough hygiene of the mouth suggest the importance of especial regard to this avenue of entrance by which so many general disorders find their way into the economy. The value of a careful and accurate study of the best means of securing immunity from diseases, both general and local, by means of suitable antiseptic and hygienic measures, with reference to the oral cavity, is unquestionable. That the means at present in popular vogue is insufficient, will not be gainsaid. More light is needed in this direction. Shall it not come from our own ranks?

DR. GEORGE WATT.

WE have received with deep regret the announcement of the death of Dr. George Watt, long and favorably known as a dental practitioner and writer. He died at his home in Xenia, Ohio, February 16. A more extended notice of his career will appear in our next issue.

BIBLIOGRAPHICAL.

METHODS OF FILLING TEETH. An Exposition of Practical Methods which will Enable the Student and Practitioner of Dentistry Successfully to Prepare and Fill all Cavities in Human Teeth. By RODRIGUES OTTOLENGUI, M.D.S. With 236 illustrations. 8vo, cloth, pp. 200. Philadelphia, The S. S. White Dental Manufacturing Co., 1893. Price, \$2.50.

This work has so recently appeared in serial form in the pages of the DENTAL COSMOS, that any extended description of its scope and character is entirely unnecessary in this place.

The author in his modest preface says, "I have endeavored to write a book which would be as practical as words could make it. There is not a case described that has not occurred in my practice. There is not a method advocated that I have not tested. . . . I do not make any broad claims for originality in connection with the methods described. If there is any originality at all, it is in the method of teaching, rather than in the thing taught."

A book which is the outcome of a man's life will itself live, and we have here a work which is not a mere compilation of the teachings of other writers, but is evidently the carefully considered result of his own experience and observation. Such a work is always entitled to respectful consideration, even from those who may find their own experience at variance with the conclusions drawn or the practice recommended.

Even though he finds some things with which he disagrees, no practitioner of dentistry can read this volume without learning very much that is profitable to know. The teachings are in the main sound and practical, and the illustrations which accompany the letter-press excellent, and often as original in design as they are admirable in execution.

Dr. Ottolengui deserves the hearty thanks of the entire dental profession for this valuable contribution to its literature. It is a work which should be in the library of every dentist and in the hands of every progressive student.

W. F. L.

ELEMENTS OF CHEMISTRY AND DENTAL MATERIA MEDICA. By J. S. CASSIDY, D.D.S., M.D., Professor of Chemistry and Materia Medica in Ohio College of Dental Surgery. Pp. 356 and Index. Cincinnati, Robert Clarke & Co., 1893. Price, cloth, \$2.50.

This is a book admirably adapted to the needs of the dental student. It is written by one evidently familiar with these requirements from the standpoint of practical experience as a teacher. It contains the essential elements, and furnishes the ground-work of a fundamental knowledge of the subject, and while it necessarily presents the matter in condensed form, it is full enough for the end in view, and avoids the confusion which so easily arises in the effort to produce a more cyclopedic work. A few typographical errors are noticeable, which will no doubt receive correction in later editions. The author adopts the revised spelling of chemical terms recommended by the committee of the American Association for the Advancement of Science.

THE ANGLE SYSTEM OF REGULATION AND RETENTION OF THE TEETH. Third edition, revised and enlarged. By EDWARD H. ANGLE, D.D.S., former Professor of Histology, Orthodontia, and Comparative Anatomy of the Teeth in the Dental Department of the University of Minnesota. Paper, pp. 51. Published by the Wilmington Dental Manufacturing Co., Philadelphia, Pa. Price, 75 cents.

This pamphlet contains careful, precise directions for applying and using the methods and apparatus which the author has found most satisfactory in his wide experience in this special department of dental practice. The illustrations are clear and ample, and the descriptive text all that is needed to enable the reader to follow the methods taught.

PEARSON'S DENTISTS' APPOINTMENT BOOK FOR THE VEST POCKET. Published by R. I. Pearson & Co., Kansas City, Mo.

This convenient appointment book is a welcome annual visitor which satisfactorily meets the requirements for which it is intended.

OBITUARY.

DR. EDGAR PARK.

AT a meeting of the St. Louis Dental Society, held January 17, 1893, the committee appointed to prepare a memorial and resolutions on the death of Dr. Edgar Park, formerly an active member of this society, submitted the following report, which was adopted :

IN MEMORIAM.

Died, at Middleton, New York, August 12, 1892, EDGAR PARK, D.D.S., in the fifty-second year of his age.

Dr. Park was born in Wainfleet, county of Welland, Ontario, April 21, 1840. His family were English people. Up to the time of his leaving home, his education was only such as was obtained from the common or public schools. He left his home at the age of sixteen, with but a scanty wardrobe and twenty dollars, bound for Texas, but owing to his financial condition, stopped at Chicago, where he obtained employment, and by taking a course in Bryant & Stratton's Business College made some advance in education and position. Through the influence of and association with his uncle, Dr. Park, of Chicago, with whom he lived, he became deeply interested in the study of medicine, and attended a regular course at Rush Medical College. Later his attention was directed to the special branch of dentistry, and he adopted it as his profession, entering upon a course of study at the Ohio Dental College in the year 1864, and graduating at the Missouri Dental College in 1869.

He was associated in practice with Dr. W. W. Allport, of Chicago, for a short time, after which he came to St. Louis and took a position as assistant to Dr. C. W. Spalding, in 1865. In 1867 he became associated with Dr. H. J. McKellops, and remained with him until 1870, when he opened an office of his own. He soon secured a lucrative practice, and was highly esteemed socially and professionally. In 1873 he was happily married to Mary C. Fisk, an accomplished and lovable woman, daughter of General Clinton B. Fisk.

He continued the practice of his profession until March, 1884, when failing health compelled him to retire, and, after an illness of eight years, he died at Middleton, New York, August 12, 1892. His wife and five children (four daughters and one son) are left to mourn the death of a devoted and an affectionate husband and father.

Dr. Park was devoted to his profession, and was often heard to remark that, "If I were worth a million, I would never give up the practice."

He was a progressive man, and ambitious to see the professional standard raised and honored; was foremost with those who labored to advance the profession by filling its ranks with honorable, capable men. He was a self-made man in every respect, a man of great natural resources and exquisite literary taste, and extravagantly fond of art, and always longed for the moment when he could have time and means to gratify his taste in this direction.

He was a devoted professional brother, interesting, sociable, kind, and charitable, an active worker in the St. Louis Dental Society, always ready to do his share in whatever position he was called to act. He received the highest honors in the gift of the St. Louis Dental Society.

He was a member of the American Dental Association, and for one year

recording secretary ; also a member of the Missouri State Dental Association. He was at one time a member of the Illinois Dental Society.

Dr. Park was a careful, painstaking, conscientious operator of acknowledged ability, and much of his work stands to-day as a monument to his skill.

WHEREAS, In the death of Dr. Edgar Park, our esteemed associate and active worker, the St. Louis Dental Society has lost one of its most worthy and honored members, a man of sterling professional integrity, full of generous impulses and kindly feeling ; therefore be it

Resolved, That this expression of our regard and deep regret be spread upon the records of this society, and that a copy be transmitted to the bereaved wife and family, to whom the society tenders its sincere sympathy ; also

Resolved, That a copy of this memorial and resolutions be sent to the leading dental journals for publication.

WM. H. EAMES,
A. H. FULLER,
WM. N. MORRISON, } *Committee.*

WM. CONRAD, *Corresponding Secretary.*

DR. WASHINGTON G. WINTER.

DIED, at San Francisco, Cal., December 24, 1892, of apoplexy, WASHINGTON G. WINTER, M.D., D.D.S., aged forty years.

Dr. Winter was born in Dane, Wis., December 8, 1852. He received his early education in the public schools of his native state, and at the Maryland University at Beaver Dam, Wis. He went to California in 1875, and commenced the study of dentistry in the office of his uncle, Dr. J. W. Winter, at the same time attending the Medical College of the Pacific, now the Cooper Medical College, from which he graduated in 1878. During the winters between the regular terms of medical studies he entered the Philadelphia Dental College, receiving his diploma in 1877. He returned to San Francisco and completed his medical course, and then entered his uncle's office, remaining with him two years, after which he purchased the office and practice, and since that time, 1880, was actively engaged in the practice of his profession up to the time of his sudden demise.

Dr. Winter was prominent in Masonic circles, and the evening preceding his death had just laid down the symbols of office, installed his successor, and retired with the rank of Eminent Past Commander of California Commandery, No. 1.

DR. WILLIAM NOBLE BUSH, SR.

DIED, at his residence, 136 Hewes street, Brooklyn, N. Y., February 3, 1893, of pneumonia, Dr. WILLIAM NOBLE BUSH, SR.

Dr. Bush was born in Westfield, Mass., January 21, 1829. He commenced the study of dentistry with Dr. I. Woolworth, of Westfield, Mass., about 1849, and in 1851 entered upon the practice of his profession in the same town. In 1854 he removed to Prattville, Ala., where he continued to practice until 1873, when he settled in Brooklyn, where he remained in practice until his death.

Dr. Bush was married at Prattville, Ala., in 1859, to Miss Ellen Fay, of Rutland, Vt., who survives him, together with two daughters and three sons. Two of the latter, Drs. C. A. and W. N. Bush, Jr., are members of the dental profession.

DENTAL LEGISLATION.

DENTAL LAW OF HAWAII.

WE copy from *The Daily Bulletin*, of Honolulu, the following act, which was approved by the queen December 19, 1892, and takes effect from that date :

AN ACT TO REGULATE THE PRACTICE OF DENTISTRY IN THE HAWAIIAN KINGDOM.

Be it enacted by the Queen and the Legislature of the Hawaiian Kingdom :

SECTION 1. From and after the passage of this act it shall be unlawful for any person or persons to practice dentistry in the Hawaiian Kingdom except upon a certificate issued from a board of dental examiners.

SEC. 2. The board of dental examiners shall consist of three members, namely, one physician and two dentists, who shall be appointed by the Minister of the Interior, and whose first term of office shall be for one, two, and three years, and thereafter shall hold office for three years. The said board to act without compensation.

SEC. 3. It shall be the duty of the board of dental examiners to issue certificates of qualification to any person or persons at present engaged in the practice of dentistry who, within sixty days from the passage of this act, shall file an application before said board under oath and sworn to by two or more reputable citizens, setting forth the fact that he has been engaged in the active practice of dentistry in the Hawaiian Kingdom for two or more years previous to the passage of this act.

SEC. 4. It shall be the duty of the said board to issue certificates of qualification to any person or persons at present practicing in the Hawaiian Kingdom who shall file an application in writing within sixty days from the passage of this act and pass a creditable examination before the board upon dental medicine and surgery.

SEC. 5. It shall be the duty of the said board to issue certificates of qualification to any person or persons at present practicing in the Hawaiian Kingdom who shall present within sixty days from the passage of this act a diploma from a reputable dental college.

SEC. 6. From and after sixty days subsequent to the passage of this act the said board shall issue a certificate of qualification to any person who shall present a diploma from a reputable dental college, or who shall pass a creditable examination before the board.

SEC. 7. Any person or persons receiving certificates from said board shall present said certificates to the Minister of the Interior, who shall record same in a book kept for such purpose.

SEC. 8. Any person or persons who shall violate the provisions of this act shall upon conviction thereof be liable to a penalty of not less than one hundred nor more than five hundred dollars. *Provided*, That nothing in this act shall be construed so as to prevent the extraction of teeth under circumstances of necessity.

SEC. 9. This act shall take effect from and after the date of its approval.

PERISCOPE.

ON SOME MECHANICAL DEVICES FOR THE RETENTION OF ARTIFICIAL DENTURES.—Mr. President and Gentlemen: Having been engaged for some time in an endeavor to improve the method of constructing bands by which artificial plates are steadied and held in position, I beg to lay before you the results of some experiments aimed at the production of hinged bands, whereby teeth may be clasped around their most constricted portions, unimpeded, nay even assisted by, the overhanging and expanded portions of their crowns.

From this variation in construction we are enabled to insure more accur-

ately fitting plates, and in many instances to effect a material reduction in their size. These bands are of two varieties, the first being self-adjusting, and are designed on the principle of the spring rings frequently attached to watch chains, while the other is a modification of the ordinary brooch joint.

The self-adjusting band is made by taking a piece of thin gold tube, about three-eighths of an inch long, the width exactly corresponding to No. 14 standard iron wire gauge. One end of the tube is made solid for about one-sixteenth of an inch by soldering into it a piece of gold wire, while the inside of the opposite extremity is tapped with a screw for one-thirty-second of an inch. A slot is sawn through the middle of the solid extremity parallel to its long axis, and carried as far back as the hollow part, or tube, and rather farther on one side than the other. Into the slot a flat piece of gold is fitted, to form the tongue, or middle portion of a hinge, the width of the tube, but projecting slightly beyond its anterior extremity; the opposite extremity of the tongue reaching as far back as the short side of the slot. A hole is next drilled through the solid part of the tube and the tongue, at right angles to the slot, and a pin is passed through them and ultimately riveted or screwed. A band having been accurately fitted to the model, is soldered to the anterior extremity of the tongue, and when this is replaced in the slot and transfixed by the pin the whole forms a hinged band. A piece of extended spiral spring is now thrust into the open end of the tube until it presses against the tongue, and is then held in position by a small gold plug screwed into the tube behind it. It will greatly facilitate rapid and accurate cutting of the slot if a piece of steel tube with a slot in one end, called a template, is used as a guide; and if a hole is drilled in the template across the slot it insures the hole in the gold tube being properly placed.

The band so formed may be attached to a gold plate, by removing the spring and soldering the tube in the most suitable position, the spring being subsequently replaced and retained by the screw plug. Where vulcanite is used it is necessary, before packing, to fill in the slot with a little osteo, to prevent the ingress of rubber, the osteo being subsequently dissolved away with hydrochloric acid.

Such a band will automatically open and close as it reaches the expanded or contracted portions of a tooth, when it is necessary either to insert or remove the plate, and will be found most useful in the very class of cases in which an ordinary band fails. While the spring effectually retains the band in contact with the constricted portion of the tooth, it readily allows it to be opened, and thus avoids the friction and resulting pain that so frequently accompany the use of tight bands.

In some cases it is useful to employ a band which can be opened, and will remain fixed in this position while the plate is being inserted or removed from the mouth, the band then being closed and remaining immovably fixed until it is intentionally opened again.

In this case the band is soldered to the piece of tube which forms the central portion of a brooch joint, the band being carried sufficiently beyond the tube to press on a small flat spring bent into the shape of a horseshoe magnet. This causes the joint to open or close with a snap, the spring locking the band securely in either position.

In order to prevent the ingress of rubber during packing, or of food when in use, the joint and spring are inclosed in a small gold box,—which measures only three-sixteenths of an inch in its largest diameter,—which can be soldered to a plate or imbedded in vulcanite.

Cases sometimes present themselves in which but one or two teeth, say a second bicuspid or first molar, have been lost on one side of the mouth only, the resulting space being wedge-shaped, with the base toward the gum, from the tilting of the adjoining teeth. The difficulty of treating such cases is obvious, for either the plate is too large to pass between the approximated crowns, or when in position is very loose, from the gaps which must exist between the plate and the necks of the natural teeth.

Such cases are usually treated, if treated at all, by inserting a plate which covers a large portion of the mouth, in order to insure due steadiness and safety. So large a plate is a source of such inconvenience to the wearer, that in many instances its use is abandoned, and the patient is therefore frequently dissuaded from having such a gap filled up at all.

Now I think it will be admitted that the smaller we can make our plates, having due regard to their safety, steadiness, and ease of insertion and removal, the better. The patient will experience much greater comfort, and less damage can be done to teeth in remote portions of the mouth.

If we make use of the locking bands just described, the treatment of such cases becomes easy. A plate no larger than the space, but which it accurately fits, has ordinary bands adjusted to the lingual surface of the tooth in front and behind the gap. Two locking bands are then adapted to the labial surfaces of these teeth in such a way that, when open, they are no wider than the width of the gap. Such a plate, when placed in the mouth with the bands open, may be dovetailed into position by pushing it outward from the lingual toward the buccal surface, and is secured by closing the bands, the overhanging crowns effectually preventing any upward displacement.

Instead of a back tooth a front one may be lost, leaving the same wedge-shaped space with the base toward the gum, and needing the same large-sized plate to carry the artificial substitute. This may, however, be obviated in the following manner: The back of a flat tooth is connected to a very small plate by a hinge, extending from one side of the gap to the other. By this means the tooth may be turned out of the way while the plate is pushed into position, by being drawn forward by its cervical extremity until it has assumed a horizontal direction. By closing the hinge the tooth becomes vertical, and is securely locked into position.

For such a purpose a small piece of plate is accurately fitted to the gap, and a band adjusted to the lingual surface of the tooth on either side. A thin, flat tooth, having the pins as near the cervix as possible, is backed and fitted in the usual manner, a small band, however, being soldered to each side of the backing, so as to fit the buccal surface of the necks of the adjoining teeth.

A piece of twelve-carat gold, the width of the space, has two parallel cuts made in it with a pair of shears, extending through about three-quarters of its length, converting it into a figure somewhat resembling a comb with three equal teeth. The back of the comb is soldered to the plate so that the comb lies exactly behind the backing of the mineral tooth. A piece of thin gold tube is next soldered to the top of the two outer teeth of the comb, and cut away from the central one. This central piece of tube is soldered to the backing of the tooth, so that when a pin is thrust through the tubes the tooth is connected to the plate by a brooch joint. If at the same time a little tongue of gold is soldered to the central tube so as to press on the middle portion of the comb, this, being a spring, will press on and retain the artificial tooth, either in a horizontal or vertical position.

When these small buccal bands are too conspicuous, from the necks of the teeth being frequently displayed, an artificial tooth may be retained in the dovetailed space by small blades pressed against the approximal surfaces of the adjoining teeth, by means of a spiral spring.

A small plate, the size of the gap, is struck up, and its sides reduced until it will just pass through the narrowest part of the space between the neighboring teeth. A flat tooth is backed and fitted in the usual manner. Two thin blades are then fitted to the necks of the approximal surfaces of the adjoining teeth, and one is soldered to the plate. A small piece of square gold tube is next soldered, so that it lies transversely across the gap, immediately behind the backing of the tooth, and closed at one end by being in contact with the blade. A piece of square wire, which fits the tube, but not so long as it, is next soldered by one end to the other blade, so that when all are in position the wire will lie inside the tube. A slot is next cut in the upper surface of the tube, parallel to its long axis, but not extending as far as either end, and a small hole is drilled and tapped in the wire, so that a screw may pass through the slot and retain the pin wire in the tube, at the same time allowing it to travel inward and outward for a short distance.

If a fine extended spiral spring is thrust into the tube in front of the wire, and the latter is screwed into position, the spring will tend to push the wire and blade outward against the adjoining tooth, and so retain the artificial one in position.

An objection will at once suggest itself that the lateral pressure on the

natural teeth will tend to loosen and displace them; though this seems probable, the spring employed is so weak that such an unfortunate result has not hitherto occurred.

At one time, I hoped that the alloy known as nickel steel would prove of value to us, from its elasticity and non-liability to rust. So much difficulty, however, is experienced in combining such a quantity of nickel with the steel as will prevent oxidation, and yet not impair the elasticity of the steel, that up to the present its use has proved impracticable for our purposes. Gold has therefore been the material employed in the construction of the springs previously described, the alloys found most useful being:

		DWTS.	GRS.
For spiral springs 15 carat.....	{ F.G.	12	12
	{ F.S.	2	12
	{ F.C.	5	0
		— — —	— — —
	Oz. troy	20	0
For all the other springs 12 carat, pale.....	{ F.G.	10	
	{ F.S.	6	
	{ F.C.	4	
		— — —	
	Oz. troy	20	

—*Storer Bennett, F.R.C.S., in Trans. Odont. Soc. of Great Britain.*

REFINING DENTAL ALLOY.—H. N. Warren describes a quick method for refining dental alloy, *i.e.*, silver alloyed with from twenty-five to thirty per cent. of platinum. The latter metal will dissolve in nitric acid when sufficient silver is present, but in the present instance only some ten per cent. of the platinum passes into solution after long boiling. The whole of the silver in the alloy is of course dissolved at the same time, and on introducing a bar of copper into the solution both the silver and platinum are quickly replaced. A further addition of nitric acid now redissolves the silver, leaving the platinum untouched. On dissolving the latter, together with the other fifteen to twenty per cent. of the same metal left at first, in *aqua regia*, precipitating by an excess of ammonium chlorid, evaporating to dryness and igniting, pure platinum remains. The silver is recovered in the usual way by precipitation as chlorid, but this method would be useless before removal of the platinum, since nearly a fourth of the amount present would be carried down with the silver chlorid.—*Chem. News.*

PENTAL AS AN ANESTHETIC.—P. F. Fedoroff (*Vratch*, No. 48, 1892) tried pental in one hundred and seventeen minor operations (extraction of teeth, opening abscesses, amputation of fingers, etc.) in patients aged from fourteen to fifty-six. A somewhat modified Junker's inhaler with Waldenburg's mask was employed, and from two to eight grams (mostly from four to six) of pental administered. The duration of anesthesia varied from half a minute to fifteen minutes (average, two to four). In about fifty per cent. of the cases the pulse remained unaffected, but in some patients an acceleration with lowered vascular tension was observed, while in others arrhythmia was also noted. In a small proportion of cases the respiration was quickened and superficial. When the dose did not exceed six grams the loss of consciousness seemed to be incomplete, the patient exactly following the operator's directions; nevertheless, many of the patients, after recovery, could not recollect what had taken place during the narcosis. In the case of incomplete narcosis, tactile sensibility sometimes appeared to be intact, though sensibility to pain was totally abolished. Complete corneal anesthesia was but rarely noted, while muscular relaxation could not be obtained even in the deepest narcosis. As a rule, no excitement whatever occurred. As regards unpleasant after-effects, there were now and then observed weakness (especially about the legs), tremor, headache, giddiness, and causeless laughter or tears, which, however, always ceased spontaneously in from two to four minutes. For about fifteen minutes after discontinuing the inhalation the patient's breath always retained a strong smell of pental, which is thought to indicate that a certain proportion of the substance is eliminated in an undecomposed condition through the lungs.—*British Medical Journal.*

THE THERAPEUTIC USE OF SYRUP OF CHLORID OF IRON (Ved.).—Owing to its destructive action on the enamel of the teeth and liability to disturbance of the stomach, the tincture of iron is objectionable. It may be advantageously replaced by the syrup. In this preparation the excess of acid is neutralized by an alkali, and while still presenting an acid reaction, it does not attack the teeth nor discolor the tongue. When it reaches the stomach it meets the free HCl and becomes therapeutically identical with the tincture. The syrup is more assimilable, and gives rise neither to nausea nor digestive trouble. Dose, \mathfrak{zss} , three times a day.—*Times and Register, from Le Medicine Moderne.*

HINTS, QUERIES, AND COMMENTS.

THE "COBALT" OF HERBST.—In all essays and discussions relating to the method of treating exposed pulps recently introduced by Dr. Herbst and advocated by Dr. Bödecker and others, much uncertainty has been manifested with respect to the exact nature of the substance which is the principal active ingredient in the mixture used in the new treatment, called cobalt by the originator of the method, and for which such remarkable results are claimed.

Cobalt is the name of one of the elementary metals. It derives its name from its principal ore, which is a native compound of the metal cobalt and metallic arsenic. It contains from thirty-three to thirty-five per cent. of the latter. These ores are known variously as speiss cobalt, cobaline, glance cobalt, cobalt bloom, and earthy cobalt.

The term cobalt as applied originally to the arsenical ores of the metal now known as cobalt was derived from the word Kobold, the German miners' term for an evil spirit or sprite which was believed by them to inhabit the mines and to maliciously bewitch these ores, which they mistook for silver ores, and thus prevent their reduction to metallic silver; for it was found that, upon subjecting them to heat, a poisonous and garlicky vapor was driven off, leaving a refractory and infusible residue which produced no silver, and therefore was to them of no value. The later improvements in metallurgical processes and the development of chemical knowledge resulted in the isolation of the refractory metallic base, which was given the name cobalt in recognition of its origin and association.

The soluble salts of cobalt are irritant poisons, though the cobalt oxid prepared by precipitating the cobalt chlorid with potassium hydrate has been used internally for the treatment of rheumatism, and in doses of ten to twenty grains as an emetic.

The fact that some of the cobalt ores contain arsenic has led to the application of the name cobalt to the "black arsenic," which is the metallic arsenic sold as "fly powder" or "fly stone."

The existing confusion respecting what was really meant by the term cobalt as used by Dr. Herbst suggested to the writer the desirability of investigating the matter, with a view to determining the exact character of this so-called cobalt, in order that its relationship to the ordinary method of pulp-dentalization by arsenious acid might be correctly made out.

Through the courtesy of Dr. Bödecker, a sample of the mixture of cobalt and cocain as advised by Dr. Herbst, and which as stated by Dr. Bödecker in

his letter accompanying the sample was sent to him by Dr. Herbst, was subjected to a chemical and microscopical examination, as follows. The cocain was first removed by solution with warm water slightly acidulated with hydrochloric acid, and the black residue afterward washed and dried. The residue was a rather coarse powder, with particles varying in size from that of a fine-grained rifle powder to very fine, almost dust-like particles. Under a low power of the microscope the powder was seen to be made up of black, lustrous, metallic particles with distinct cleavage planes and presenting the usual physical appearances of metallic arsenic. Heated on charcoal before the blow-pipe, copious white fumes were driven off with the characteristic garlicky odor of arsenic. Heated in a closed tube, the substance was *completely volatilized*, with formation of the arsenical mirror-like ring at the cooler part of the tube. Roasted in an open tube, a white sublimate was formed, which under the microscope showed the characteristic octahedral crystallization of As_2O_3 . Treatment with hydrochloric acid and afterward immersing a strip of clean copper foil in the solution so obtained (Reinsch's test), developed the unmistakable arsenic reaction. Hydrogen sulfid threw down the yellow precipitate of arsenic sulfid. From the foregoing tests it is unquestionably a fact that the "cobalt" of the Herbst method for treating pulps is not what is now known to chemists as cobalt, but pure metallic arsenic, and nothing else. Whether the cocain hydrochlorate, of which eight per cent. is added, has any function apart from its usual anesthetic property, is not clear, but it may easily be that it is to a certain extent decomposed, giving up its chlorin to a portion of the arsenic, and so forming an arsenic chlorid which, being soluble, would be more readily absorbed by the pulp. It is also possible that the free acid which most of the samples of cocain hydrochlorate are said to contain may also help to increase the solubility of the metallic arsenic. Be that as it may, it is well for us to recognize, before adopting this method, that whatever of value it may have is due to the effect of arsenic, and not in the remotest degree to cobalt.

As to the effects of arsenic upon an exposed pulp, the dental profession are pretty familiar. How far they may be modified as to the final result by using metallic arsenic instead of its oxid, remains to be seen, but it does not seem difficult to guess.—EDWARD C. KIRK.

IMPROVISED MATRIX.—I feel constrained to offer or suggest a little device in the way of a matrix which is simple and effective, requiring but a few minutes to make and adjust. It may be modified to fit all approximal cavities in the molars and bicuspid.

For example, take the superior bicuspid. After dressing down the friable edges and excavating in part, adjust the dam and finish the excavating. Take a strip of German silver plate of suitable width,—the gauge may be determined by the space between the teeth, ordinarily about 29 or 30,—polish and burnish, insert between, leaving the ends stick out each side a trifle less than one-quarter of an inch beyond the teeth.



Scratch a line with an excavator across the strip on each side of and being guided by the width of the tooth. Remove the strip, and with a suitable tool curl the ends back to the scratch, leaving the space in between the walls or shoulder so made just wide enough to engage the opposite tooth and hold

the matrix from sliding laterally. Make the convex for contour of filling with a clasp tool.

If a dip is required to reach down below the cervical border, cut away with a stub corundum in the engine; it may be also cut away on the top for light and space if the lower part of the cavity is obscure.

The rolls may be so bent that they will spring over the swell of the tooth, which keeps the matrix from working out while filling.

If this idea has been published, I am not aware of it.—D. W. CLANCEY, Cincinnati, O.

DENTAL ANOMALIES.—I have noticed from time to time in the *DENTAL COSMOS* articles on the subject of "Dental Anomalies." Having recently encountered two cases which differ, I think, from any of which I have noticed mention, I thought it possible they might be of general interest. The first is that of an inferior wisdom-tooth; the patient a male, aged about forty-five, general health good, with no evidence of any dyscrasia. The history given was that for some time he had had trouble in the region of the tooth. He had applied to a dentist, who had tried without success to remove what seemed to be the root of a tooth. Upon examination I found a large epulis of cauliflower appearance, very vascular, and bleeding profusely upon the slightest touch, its size about that of an English walnut.

With an instrument I could detect at its base a hard substance, which I proceeded at once to remove. I will not attempt a description. The illustrations (Fig. 1) plainly show it to be an anomalous wisdom-tooth, the greater portion of it having been destroyed by decay. Instead of its possessing a root, it had assumed a shape to be likened to that of a turnip, and growing rather upon the process than into it. After having removed it, I asked the gentleman to go with me to the office of two

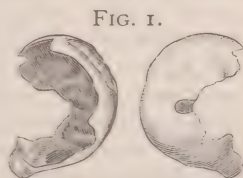


FIG. 1.

FIG. 2. prominent surgeons, my purpose being to see what they would advise, as I felt certain they would pronounce it a malignant tumor and advise its extirpation. In this I was not mistaken. My advice to the patient was to go home, with the assurance that, the cause having been removed, the tumor would disappear.



The second case (Fig. 2) is that of a supernumerary deciduous tooth, the root of which is fused into that of the superior left lateral, or it may be described as a deciduous superior lateral incisor with two distinct crowns, the two roots being fused into one.—C. B. MOWER, Wooster, O.

TROPACOCAIN.—MM. Pinet and Viau communicated in January, at the Odontological Society of Paris, a very interesting article on local anesthesia in dental surgery with tropacocain.

These authors made several experiments on guinea-pigs, and finally on man, in twenty-nine cases in which they gave the drug hypodermically. In not one case, notwithstanding the nervous excitability of the patients when the operation was performed in the presence of many students, did the least bad symptoms appear; even three-quarters to one grain of the drug being given to nervous, advanced anemics and tuberculous patients with no bad symptoms occurring. They have, however, observed, contrary to what occurs with cocain, an increased activity in the peripheral circulation; the face takes a characteristic rosy hue, the extremities are warm.

Their conclusion: Tropacocain hydrochlorate possesses local anesthetic properties analogous to cocain.

For dental operations, two-thirds of one grain in fifteen drops of water is sufficient in ordinary cases. When difficult extractions present, four-fifths of one grain gives a complete anesthesia.

Small guinea-pigs are killed by four-fifths to one and one-fifth grain of the drug. As a general rule, the larger an animal is, the more of the preparation is needed.

The degree of concentration of the solution is important. The more concentrated the solution, the more rapid the action of the drug.—A. C. HUGEN-SCHMIDT, Paris, France.

TO FILL A ROOT WITH CHLORO-PERCHA OR ANY LIQUID.—Dip the points of a pair of Dr. Flagg's dressing tweezers, while closed, into the liquid. Carry them, charged with the liquid, well up the root. If they are then carefully withdrawn, and at the same time are allowed to open, the liquid will be left in the root.—WALDO E. ROYCE, Tunbridge Wells, England.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY ISSUED DURING JANUARY, 1893.

- January 3.—No. 488,976, to W. T. ADAMS. Mold for artificial teeth.
 " " No. 489,117, to F. H. BERRY. Dental engine.
 " " No. 489,235, to A. S. RICHMOND. Dental apparatus.
 " " No. 489,416, to F. K. HESSE. Dental engine.
 " " No. 22,296, Trade-Mark to J. J. OTTINGER. Dentifrice.
 January 10.—No. 489,675, to A. P. GOULD. Dental chair.
 " 17.—No. 490,090, to S. C. G. WATKINS. Head-rest.
 " 24.—No. 490,516, to E. T. STARR. Dental chair.
 " " No. 490,541, to F. E. CASE. Head-rest.
 January 31.—No. 490,637, to M. BUTLER. Dental chair.
 " " No. 490,831, to H. LOEHR. Tooth-brush.
 " " No. 490,930, to R. G. STANBROUGH. Grinding apparatus.

THE DENTAL COSMOS.

VOL. XXXV.

PHILADELPHIA, APRIL, 1893.

No. 4.

ORIGINAL COMMUNICATIONS.

MASTICATION IN MAN.

BY HANS BLOCK, DRESDEN, GERMANY.

(Continued from page 192.)

THE NORMAL HUMAN DENTURE.

WE shall study now the adult human denture in its normal and natural relations. This description will not include the forms of the surfaces of the individual teeth, as these can be studied from Dr. Black's excellent work on the "Descriptive Anatomy of the Human Teeth," but it will give only the landmarks and characteristics which constitute or affect occlusion.

This classification, as will be seen, is mostly a compilation from numerous authorities.* It must therefore cover the field a little better than the description of any one of the single authors could do, because all the rules are grouped together and the study of the object is logically systematized.

Fundamental Law of Construction.

"The arrangement of the teeth and jaws is in consonance not only with the laws of geometry, physics, and mechanics, but also according to those for the economy of force."—*Dr. Solomons.*

This is excellently said, but while the author emphasizes the physical laws of usefulness and permanence to which the articulation is adapted, he should also recognize that the esthetical laws of regularity and

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beauty have no less share in its construction. "Beauty," says Dr. Kingsley, "comes from graceful variation," and indeed every undulated outline which entices the eye is beautiful, especially when the curve appears in accordance with the design of the object, so that the originating idea becomes evident. Without harmonious correlation and equilibrium of form and purpose and requirement, nothing can be tested as beautiful. That the human denture is such a unit of beauty, because it combines grace with the utmost practicalness, will in many respects be demonstrated by this treatise, as we shall evidence that it bears the stamp of a majestic, sublime genius in its entire arrangement.

These laws, as a whole, have often been observed and mentioned in numerous articles by the most distinguished dentists, living and past; they have found admirers and incited noble efforts in all civilized countries; they have been imitated (and have in this way brought to life the art of dentistry),—but they have never been corroborated in full. It is, therefore, perhaps worth while to undertake such a proof which will show the correctness of the main part of this law, and in doing this, interpret the "why" by illustrating its negative. Therefore when we meet the question, *Why* is the masticatory apparatus such a perfect instrument (as indicated in the above laws) that it is beyond improvement, we need merely to sketch how this organ would work if it were *not* what it is.

For this purpose we will chiefly confine our investigation to the lower jaw, as it is the movable part of the apparatus, the upper being really only the negative matrix of it; and the reader is invited to follow a momentary departure from the actual conditions of the lower maxilla in order to become convinced of what the result of mastication would be if such an arrangement had not been made by nature. It is evident to every student of biology that the lower jaw could not be the most powerful instrument in the armamentarium of most animals if it had not been constructed on the most effective principles. But in order to suppose that nature "missed her object" because she could not overcome the architectural difficulties, let us, for a moment, imagine it would have been better if the lower jaw had been devised on the same principle as the extremities,—that is, if one-half of the jaw hung down freely on each side of the skull without any bony or cartilaginous connection in the middle, just as the arms or legs extend free and independent on each side, the left extremity not being united with its fellow on the right side. What advantages, if any, would this arrangement afford for mastication? Both sides could chew at the same time, as they would act independently of each other. One side could take a vacation, while the other side alone might do the work. Furthermore, what a grand field of mobility would be at the disposal of each half! Perhaps many other improvements would come into full play if we could only see such wonderful arrangement as a left jaw and a right jaw! But now comes the other side of it: the disadvantages of such a construction would be even greater. To point out only a few of them, let us imagine how often the pharynx would get into a perilous dilemma, not knowing which bolus it had to swallow first, the one prepared by the right or the one from the left maxillary half. Suffocation would indeed become a common accident. The greatest disadvantage, however, would be the considerable loss of efficiency,

—a loss, as we shall see, so great that the whole apparatus would become a miscarriage and a source of failure. For there can be no doubt that not only for the act of biting—that is, for cutting the food—the provision of two arm-like maxillary extremities (without the junction in front) would be a miserable failure, as the biting apparatus proper represented by the cross-bar with the six anterior teeth would be missing, and consequently only one pair instead of three pairs of teeth on each side could be brought into action when a larger alimentary object was placed at the entrance of the oral apparatus in order to have a part of it cut off for mastication, but the whole work of grinding would be done with much less power, because, with no transverse connection between the two halves of the jaw, the transmission of force from one group of muscles on one side of the oral cavity to the group on the other side would be impossible, to say nothing of the unsafety and awkwardness of the movements intended to crush the food between the teeth.

It can meet no contradiction when we say that precise and regular movements are far better adapted for effectiveness than uncontrolled and unguided motions.

Now, is it not clear that nature, by forming a transverse connection in front between the two lateral arms, intended to bring one arm under the control and to the assistance of the other?

Those, however, who do not believe that stability and accuracy of motion are of the utmost importance for the proper and perfect performance of the masticatory act, and for the preservation of the organs of mastication themselves, are referred to the following described case, which perhaps will partly illustrate the righteousness of these claims.

Before us is the skull of the Hawaiian chief whose history was discussed in the DENTAL COSMOS of January, 1893. As it will be remembered, this skull shows a partial ankylosis of the temporo-maxillary articulation of long standing on the right side, with consequent limitation of its movements, and on the other side of the jaw, where motion was impaired, the teeth are conspicuously worn down; the cusps have really disappeared, so great was their wear, while the right half of the apparatus where inactivity was compelled shows the cusps undamaged. This may be taken as an indication of what would happen if the left side of the masticatory apparatus could act as an independent arm, separated from the right half. The movements of mastication would jar the teeth so violently against each other (for want of collateral action of the muscles on both sides) that probably the food would be ground less than the teeth themselves, and this undesirable mechanical abrasion would result in a premature destruction of the teeth, and the poorly-ground food would besides be more or less difficult of digestion.

To resume the considerations which were intended to get at the bottom of the law of construction of the jaws, we have seen that nature's arrangement is indeed the wisest one, for if the two halves of the jaws were *not* locked together in front we should have the following difficulties:

1. Each separate half would be weaker than the horseshoe-arch, in whose unity lies strength.
2. The trituration of the food would be less thorough, as the teeth

could not be brought in contact with the same *force*, because the transmission of muscular force from one side to the other by means of the transverse connection would be missing; nor with the same *firminess*, because a jaw jointed at only one end cannot move so accurately and with such a commensurate equality as one hinged on both ends.

3. Large pieces of food placed at the entrance of the oral cavity could hardly be bitten off if there was no full jaw in front, nor could the entrance of hostile elements into the mouth be prevented if there were no wall formed of bone and teeth.

4. The danger of luxation would be far more imminent than it is now, because the jaw could be not only dislocated in the forward direction (when the condyle glides over the eminentia articularis), but also laterally both ways, inside and outside, in consequence of the extensive (we might say preternatural) mobility of each half. The same accident would, perhaps, easily occur to the upper and lower extremities were they not under the constant control of the eyes, which guide the movements that otherwise would be unsafe. But the jaws cannot enjoy this benefit.

5. The pharynx would too easily be blocked up if both sides could masticate at the same time, and the boluses would be crowded in swallowing.

The argument under No. 3 also explains why the transverse anterior bar unites the longitudinal sagittal halves of the jaw just in front,

FIG. 1.



and not in the middle or at the rear (from angle to angle), which might also have been practicable. But it does not explain why this front union was not brought about at the point of natural intersection which the longitudinal halves would have if they had been prolonged in straight lines until they meet. For it will be observed that the longitudinal arms of the jaw run in a convergent straight direction from angle to mental foramen, where they are stopped by the front bar. Why did nature not let the longitudinal jaw-halves continue their straight course until they met, as shown by the dotted lines in Fig. 1? Would that not have brought about the most natural union, and would that not have afforded a larger surface for a greater number of teeth? We shall at once see the reason why the longitudinal jaw-halves were held up in their course by the curved anterior bar, and not prolonged to their geometrical intersection.

When we measure the length of a straight line drawn from the angle

of the lower jaw to the mental foramen, and from here prolonged to the hypothetical point of intersection, we find that we get two equal distances (each about six centimeters long). That means that the effective length of each side of the jaw is just half as great as it would be were it continued to the point of geometrical intersection, or that the mental foramen where the longitudinal half unites with the transverse bar is just at the center of this "hypothetical" length of the jaw-bone.

In the illustration the measurement of the lower jaw is demonstrated on a specimen where the alveolar process is entirely absorbed and the denuded body of the bone alone is left. The theory that the alveolar process does not form a part of the true jaw, but that it is a distinct bone in itself (in the consideration of which we are not engaged at this moment), is confirmed by two authorities. Dr. Kingsley writes: "The proofs are conclusive that the jaws are developed independently of the teeth and alveolar process." And Dr. Talbot argues that the maxillary bone should be held separate from the alveolar "process," as it has another function and another structure. The maxillary bone is not influenced to any extent by movements of the teeth; the alveolar "process," however, will follow and surround the teeth in almost any position they may be made to assume. (A tooth can move one-third of an inch in three weeks.) The development of the alveolar process begins at the time of the development of the crown, and the permanent set of teeth is associated with a new alveolar process, but not with a new maxilla, and after loss of teeth the alveolar "process" is absorbed again. The latter is spongy and elastic, the maxilla compact. We will therefore contemplate the jaw independently of the alveolar "process."

We see that in constructing the jaw-bone there were two alternatives: either to make it twelve centimeters long on each side and to place on this arm about twelve teeth, or to make it only six centimeters long, then bending it to the median line, and to place on this arch eight teeth. The first way involved a profit of four teeth on each side, but all teeth standing anteriorly to the mental foramen would, as most distant from the fulcrum, be of very restricted value, if of any, as, of course, that half of the bone which is posterior to the mental foramen utilizes most of the force of mastication, because the muscles are attached there. Nature chose, therefore, the other way: viz, to reject the anterior half of the hypothetical jaw (extending beyond the mental foramen) and the four teeth to be won by it, because of its lack of effectiveness. The front bar is therefore placed accurately at the middle of the course of straight convergence of the two halves of the jaw, to have the teeth within the reach of greatest force, and to combine as far as possible intensity with extent. In fact, by this combination we find the greatest strength united with as great a working surface as possible, and this proves that the fundamental law of construction, as quoted above, is correct; or does anybody know a more perfect arrangement? No other arrangement seems to be imaginable when the chief condition for effective mastication shall be carried out, which, in Dr. Bonwill's words, is "to bring the largest number of teeth nearest the center of motion." This explains why the longitudinal bodies of the lower jaw were not prolonged any farther beyond the mental foramen toward the point of straight intersection, even though this would have accommodated more teeth in the jaw,

because the mesial half (from mental foramen to intersection) would be too distant from the center of motion, which is the center of active force.

Apart from this, we find the front bar (from one mental foramen to the opposite) is curved, again a wise device, as arches or vaults have a greater resistive power or port than flat planes. Moreover, the whole body of the jaw is slanted inward. What for?—to concentrate the masticating force. All these essential features in the form of the jaw show its wise and wonderful construction, and its admirably appropriate equipment for efficient service.

It is quite true that the jaw could have been prolonged up to the point of straight intersection and yet have retained, or even increased, its efficiency; but for this end it would have been necessary to remove the center of motion toward or beyond the mental foramen, or to increase the masticatory or the oral group of muscles so as to make the front part of the jaws just, or nearly, as powerful as the posterior part (near the ramus) is. But what a disfiguration of the human face would have resulted therefrom becomes evident from a comparison with the masticatory frame of most lower animals (where the longitudinal shanks of the jaw are, in fact, prolonged down to, or very near to, the point of straight intersection). The human face would thus have approached the ugly type of the gorilla or of the American buffalo, or of the *Rhinoceros Indicus*, etc., and so we must concede that a better union of beauty, efficiency, and economy could not be devised than is evidenced in the construction of the human jaw.

External Contour of the Mouth.

According to Wiegall, the classical face shows the following measurements:

The length of each half of the mouth is equal and parallel to the projection of the nose before the face.

The thickness (height) of the upper or of the under lip equals one-third of the distance from bottom of nose to bottom of under lip, or one-sixth of the distance from bottom of nose to bottom of chin.

The latter distance (from bottom of nose to bottom of chin) is one-half the length of the face,—that is, from nasal notch to symphysis. Hence the combined thickness (height) of both lips, or the height of the mouth, equals one-sixth of the height of the face, of which the length of the nose occupies one-half.

"The upper lip is prominent, short, and finely curved; the lower lip full, round, and not quite so prominent. It is marked at its base by a depression known as the mento-labial groove."—*Dr. Ivy*.

"A thick lip is embryonic (infantile), and characterizes lower races. It is a remains of the nursing period."—*Dr Thompson*.

"Among low races the mouth is wide; among high races the lips are contracted to the middle third of the mouth."

Dr. Holmes says, "The corner of the mouth reveals, more than any other facial sign, the nature of the individual."

Dr. Kingsley, in his work on "Oral Deformities," calls the mouth one of the great centers of expression, the other center being the eye. He writes, "The mouth presents a greater variety of expressions than any other feature. The angle of the mouth and the inner extremities of the eyebrows, as points where a number of muscles con-

centrate, are the most movable parts of the face, and on their changes expression chiefly depends." He also declares, "No single feature of the face is more capable of changing the entire expression than the teeth."

It will also be found that the length of the mouth is equal to that of the bridge of the nose; that is, the distance between the inner canthus of the eyes when measured *across* the nasal notch is the same as the distance from one canthus of the mouth to the other.

GENERAL RULES REGARDING THE ARCHES.

Size of Jaws.

"From the center of one condyle to the other four inches is about the average, and from the same center to the median line at the point where the inferior centrals touch at the cutting-edge is also four inches. Hence the lower jaw forms an equilateral triangle."—*Dr. Bonwill.*

"The normal type of the dental arch is an easy, graceful curve, expanding as it approaches the ends, wider or narrower, but without break or tendency to form an angle."—*Dr. Kingsley.*

The line connecting the centers of the two condyles may be called "the base of the triangle of the human jaw."

It may be mentioned that there is a pretty close similarity in size between the human heart and the maxillary cavity. (Under the latter name may be fancied the space occupied by the two jaws.) This observation seems to be confirmed by the fact that the lower jaw is somewhat inconstant in its relative size to the rest of the face in different individuals. When measured at their greatest diameters, near their centers, both bodies will be found to have nearly the same size.

"The heart in the adult measures five inches in length, three and a half inches in breadth, and two and a half inches in thickness," says Gray.

The maxillary cavity measures five inches in length (from condyle to symphysis), three and a half inches laterally (from one angle of curvature of the external oblique line, which might be called the inner angle of the ramus, to the opposite one), and two and a half inches vertically (from the center of the vault of the palate, perpendicular to the plane of the jaw, that is, that plane on which the jaw would rest when placed on it, symphysis and angles touching).

This is the normal average. It should not, however, be maintained that there is a constant direct or reverse ratio between the size of the jaws and heart, and that if the development of the jaws appears arrested this is accompanied or anticipated by an adequate deficiency (or conversely hypertrophy) of the heart. While this may be so, the existence of such a relation has to be first ascertained; also if there is in other animals a correspondence of this dimensive ratio or congruence shown above.

The law of harmony may furthermore be illustrated on the human skull by the following measurements, which in every case give the same distance, viz, four inches:

From the inner corner of one external angular process of the frontal bone to the opposite one.

From the anterior corner of one malar process of the superior maxilla to the opposite one.

From the summit of one mastoid process of the temporal bone to the opposite one.

From the center of the nasal notch of the frontal bone (nasion) to the center of the glenoid fossa.

From the center of the nasal notch of the frontal bone (nasion) to the symphysis of the lower jaw.

From the external angular process of the frontal bone to the angle of the lower jaw (gonion) on the same side.

From the top of the coronoid process of the inferior maxilla to the symphysis of the lower jaw.

From the neck of the condyle of the inferior maxilla to the symphysis of the lower jaw.

From the angle of one ramus of the inferior maxilla to the opposite angle.

From the proximate space between the two upper central incisors to the union of the basilar groove with the margin of the foramen magnum (basion).

From the superior angle of the occipital bone (lambda) to the most anterior point of the foramen magnum (basion).

From the superior anterior external corner of the malar process of the superior maxilla to the top of the mastoid process.

In the foregoing measurements, those related to the occipital region of the skull are true only of the Caucasian race.

The absolute distance, of course, will vary in single individuals, here being one-eighth of an inch more, there three-sixteenths less, but the relative proportion will be found constant, and will exemplify the remarkable symmetry with a view to the equilibrium of forces.

We know now that the base of the triangle of the lower jaw (or the line connecting the centers of the glenoid fossæ) is just the line of actual balance for the skull. It is true that from the glenoid fossæ backward to the occipital protuberance is only three inches, whereas forward to the nasal notch or to the central incisors is four inches, but the part in the rear from the line of balance is relatively heavier than the front part, for it has no hollow spaces containing air as the front part has, which includes the oral, the nasal, and the antral cavities, and four other sinuses on each side.

We know, further, that a horizontal connection between the malar and the mastoid processes forms two parallel equidistant lines of equal length, which connected at their ends by transverse lines form an exact square, in the middle of which is placed the basilar process in which rests the medulla oblongata, the center of animal life. We know also that the anterior transverse side of this square is parallel to a line which crosses the second bicuspid in their centers, and in this way coincides with the lateral diameter of the circle of the mouth.

Professor Flower in 1885 made the discovery that the distance between the nasion (naso-frontal suture) and basion (middle of anterior edge of foramen magnum), which he calls the cranio-facial axis, has an average length of one hundred millimeters (= four inches) in the male skull, and ninety-five in the female.

This harmony is convincing, and it requires nothing further to emphasize the perfect symmetry and the coördination of forces presented by the human skull, and the frame of the masticatory apparatus in particular.

Arrangement of the Arches.

Each jaw forms an arch of sixteen teeth.

The two articulating arches run in line with the alveolar ridges of the jaws, and are in harmonious relation to the skeleton (or the face).

The arches correspond very closely to each other in curvature, length (mesio-distal), width (bucco-lingual), and occluding surfaces

or functional arrangement, so that in occlusion there is contact all around the arch. Normal dentures have a true occlusion.

"In straight occlusion both sides of the arches meet simultaneously, none before the other."—*Dr. Haskell.*

The two halves of each arch are symmetrical in all particulars, and meet in the median line of the face.

Outline of the Arches.

"The shape of the alveolar arch presents varieties in the different temperaments.

FIG. 2.

FIG. 3.

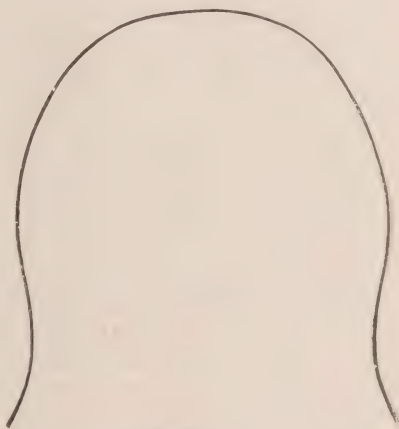


FIG. 4.

FIG. 5.



"The arch of the bilious temperament (Fig. 2) is almost flat from cuspid to cuspid, the lines backward from these points slightly diverging in an almost straight line.

"The sanguine arch (Fig. 3) resembles a horseshoe in shape.

"The arch of the nervous temperament (Fig. 4) presents a strong pointed or Gothic character; from the centrals backward (which often overlap for want of space) the line of the teeth continues backward with a slight curve, the greatest prominence being between the cuspid and first bicuspid.

"The lymphatic arch (Fig. 5) is almost semicircular in its outline."—*Dr. Ivy.**

* Figs. 2, 3, 4, and 5 are reproduced from the "American System of Dentistry," by permission of the publishers, Messrs. Lea Brothers & Co., Philadelphia.

"The upper arch forms the half of an ellipse, the lower arch a parabola."—*Dr. E. Mühlreiter.*

"The upper teeth are arranged in the form of a semi-ellipse, the long axis passing between the central incisors.

"Frequently the third molars are a little outside the line."—*Dr. Black.*

"The centers of the tips of the anterior superior teeth are in the arc of a circle whose radius equals the combined widths of the central, lateral, and canine.

"The transverse diameter of this circle will pass through the centers of the second bicuspsids, and the transverse posterior tangent will pass through the posterior edges of the second molars.

"This circle is called the circle of the mouth."—*Dr. Bonwill.*

One fact which Dr. Bonwill did not discover is that the diameter of this circle equals one-half of the length of the perpendicular drawn from the point on the median line to the base of the triangle of the jaw.

"In the upper jaw the *buccal* faces of the two bicuspsids and the first molar lie in a straight line back toward the condyloid centers. The second molar is deflected slightly inward from this line.

"In the inferior jaw the four incisors are more nearly in a straight line. The *lingual* faces of the posterior teeth (from the first bicuspid to the second molar) approach very closely a straight line."—*Dr. Bonwill.*

It is obvious that Dr. Bonwill, who has given such great discoveries to dentistry in his observations regarding the lower jaw (this must be said), is less exact than might be wished. Facts are against him. The four incisors do not stand in a straight line, nor do the teeth back of the first bicuspid. To the position of the lower cuspid and wisdom-teeth there is no allusion.

A careful study will, however, show that the labial cutting-edges (morsal surfaces) of the eight lower front teeth (incisors, cuspsids, and first bicuspsids) stand in a circle, the periphery of which equals the size of the circle of the upper jaw, and that consequently the circle of the mouth holds good for both jaws, with only the one difference that it embraces six teeth in the upper jaw, but eight in the lower.

In the lower arch the circle of the mouth touches with its periphery and also at its transverse diameter the second bicuspid at its contact point with the first molar, and the latter tooth is also intersected by the arc at its *linguo-distal* angle.

The lingual faces of the lower molars form a straight line back toward the condyloid centers.

The posterior tangent of the lower circle passes only one or two mm. behind the distal surface of the second molar.

It is strange that Dr. Davenport did not discover this relation of the circle of the mouth, as he writes, "A line drawn from incisors to molars, just touching the outline of the upper teeth, runs in the same fashion as a line touching the outside of the lower teeth;" or Dr. Wortman, who says, "Both jaws describe a regular parabolic curve." Is it not self-evident that, when the labial curves of both arches run parallel, the periphery of the circle of the mouth must also run parallel in both arches?

Really it was difficult to overlook this fact, and very little study would have sufficed to reveal the fact that both circles have the same radius.

Overlapping.

"The upper teeth overlap the lower all around."—*Dr. Dean.*

"The upper teeth close outside the lower."—*Dr. Haskell.*

"The upper teeth overlap the lower ones in front."—*Gray.*

This is an incomplete observation on the part of Gray; the overlapping of the upper back teeth seems to have escaped his attention.

"As the upper set projects outwardly beyond the lower, so does the lower overlap the upper set inwardly."—*Dr. Dean.*

"The upper teeth project a little to the labial and buccal of the lower at all points of the arch. This apposition holds the soft tissues of the cheek and tongue presented to the teeth a little apart from the actual contact points of occlusion, and thus prevents them from being caught and pinched, or crushed between the teeth in the act of mastication."—*Dr. Black.*

"The upper front teeth overlap nearly one-third of the length of the inferior front teeth. In all the teeth posterior to the first bicuspid the buccal faces of the superior teeth overhang those of the inferior, while on the lingual faces the reverse condition is observed."—*Dr. Starr.*

(As the crowns of the lower front teeth measure about nine mm., the overbite would be three mm., or one-eighth of an inch.)

"In ninety-five per cent. of cases the upper teeth project over the lower."—*Dr. Bonwill.*

"The upper front teeth usually shut over and in front of the lower, and the external cusps of the superior bicuspids and molars generally strike on the outside of those of the corresponding inferior teeth."—*Dr. Harris.*

Overbite.

"The upper teeth do not drop more than one-eighth of an inch below the ends of the lower."—*Dr. Haskell.*

"The depth of overbite is about one-eighth of an inch, and varies as the depth of the cusps of the bicuspids are deep or shallow."—*Dr. Bonwill.*

It is a question if Dr. Bonwill's observation, that the length of the cusps of the bicuspids is in relation to the length of the overbite, is correct. If so, then the overbite could never amount to three-eighths of an inch, as one-eighth of an inch is the greatest length of the point of a bicuspid, and yet sometimes we find an overbite of three-eighths of an inch. There is no obvious necessity for a relation between underbite and length of cusps, as in mastication the lower teeth need not be, and are not, carried in front of the upper, but stay behind them, and the grinding-teeth can touch each other whether the overbite of the front teeth is ten or one mm. The length of the cusps is constant, but the underbite varies considerably.

Horizontal Occlusion.

The cutting-edges of the lower anterior teeth meet the lingual surfaces of the upper front teeth, and leave no horizontal space between them, as this would lead to mouth-breathing.

"The front teeth occlude so that the morsal surfaces of the lower *make contact* with the lingual surfaces of the upper near their cutting-edges."—*Dr. Black.*

Outward and Inward Slant.

"The teeth project in most low races, and are more vertical in most civilized races."—*Dr. Thompson.*

"The teeth slope from the gum-margin to the cutting-edge; they do not stand perpendicular, but have a slight outward slant."—*Dr. Walker.*

"The teeth do not close vertically upon each other."—*Dr. Parreidt.*

"The teeth, as a rule, stand perpendicular, avoiding either an inward or an outward slant."—*Dr. Haskell.*

"From the cuspids backward the upper teeth slant buccally, the lower lingually."—*Dr. Dean.*

"The upper incisors and cuspids are inclined more or less forward from the perpendicular position, or toward the lip. As a rule, the upper bicuspid and molars are also slightly inclined toward the cheek. The lower incisors and cuspids are inclined with their crowns toward the lip, but in less degree than the upper. The perpendicular position of the lower front teeth is also normal. In many dentures the lower bicuspid has a lingual inclination, but may be perpendicular, or even have a slight buccal inclination. The lower molars usually have a slight lingual inclination."—*Dr. Black.*

"If the long axes of the conoidal sockets of the inferior maxilla be successively extended inward so as to intersect a line drawn antero-posteriorly from the nasal spine to the occipital protuberance, it will be found that their several points of conjunction will form a series of constantly increasing angles. The lower the race, the less pronounced the angle."—*Dr. Boenning.*

This, if correct, would prove that all the inferior teeth, having their axes directed toward the median line, would slant lingually.

"The six lower front teeth slant outward, the back teeth strongly lingually."—*Dr. Martin* (in the newest German text-book on dentistry).

"The upper molars are inclined outward, the lower molars inward, the lower cuspids outward."—*Dr. Davenport.*

"The upper incisors are directed obliquely downward and forward; the axis of the wisdom-tooth is directed inward."—*Prof. Gray.*

"Seen from the labial side, we find that the upper central is placed nearly vertical, the lateral recedes slightly at the cervix, the cuspid overhangs slightly at the cervix, the bicuspid and two molars stand nearly vertical. In the inferior maxilla the central projects slightly at the cervix, the lateral stands nearly vertical, crown inward, the canine stands a little inside at the cervix, the bicuspid also inside, the second bicuspid overhangs at the neck and is inclined inward, and the two molars incline inward."—*Dr. Starr.*

What is meant is that the upper teeth slant outwardly, except the cuspids; in the lower jaw the reverse slant is the case.

More divergency could hardly be desired. Some say all the teeth slant outward; others say they do not slant, but stand vertically; others say the upper slant outward, the lower inward; others state the lower slant inward; others mean they slant half inward and half outward in both jaws; and finally it is said both jaws slant inward at the rear.

Here is an opportunity for investigation.

Mesial Slant.

"The upper front teeth are slightly inclined toward the median line.

"The mesial inclination of the lower front teeth is much less than that of the upper.

"The mesial inclination is continued in the upper bicuspid and molars, diminishing from before backward, and is usually lost at the second or third molar.

"The lower bicuspid has sometimes a strong mesial inclination, at other times they are nearly or quite perpendicular.

"The lower molars usually have a slight mesial inclination; in many examples, however, it is wanting, especially in the second and third molars."—*Dr. Black.*

"All teeth are inclined forward."—*Dr. Davenport.*

"The roots of all the teeth back from the cuspids are with their apices directed distally."—*Dr. Hollaender.*

Which means that all back teeth have a mesial slant.

"The pitch of the crowns is in both jaws toward the median line."—*Dr. Starr.*

"The upper bicuspid and molars are inclined toward the condyles."—*Dr. Schwarze.*

"The lower bicuspid stand perpendicular, and the lower second and third molars are inclined forward to the median line."—*Dr. Martin.*

The latter two statements are taken from the new German student's manual, and it would be peculiar if they do not involve mistakes, as they are in direct contradiction to *all* American authorities.

"The central incisors diverge in the thumb-sucking and converge in the V-shaped arch."—*Dr. Talbot.*

"A line drawn from the apical foramen to the center of the morsal surface forms an angle which always will be found to be smaller on the distal side and larger on the mesial."—*Dr. A. Paltauf.*

This would indicate that *all* teeth slant mesially.

Plane of Articulation.

"The plane of articulation is a curve. The occluding line from the upper first bicuspid to the last molar is a bow with its back downward."—*Dr. Dean.*

This rule, which is perhaps the most important one in the study of the articulation, seems to be unknown in the colleges. All the practice sets made there by students are on their morsal plane carefully adapted to a smooth glass plate, or to a contour model which is flat, and not curved. How can such a procedure be called correct? How can it give correct ideas for future practice?

"The upper ten anterior teeth will rest evenly on a flat surface; the upper molars, however, are shorter and on an oblique line.

"The lower teeth show only the incisors and last molars touching when placed in contact with a flat surface."—*Dr. Haskell.*

"The point of the canine rises above the level of the other teeth."—*Gray.*

"The cusps of the canines as made by dental depots are always too long."—*Dr. Schwarze.*

The latter two statements contradict each other. As a matter of fact, it may be mentioned that the point on the human cuspid as it exists in the fancy of the manufacturers has hardly any real existence, and Gray's observation seems to be based either on written descriptions or on individual cases of rare occurrence. There is no use, no necessity, for a pointed cusp on a human cuspid, hence why should nature produce it?

"The line from before backward on which the occlusion occurs is a slight curve, not a plane. In the upper jaw it presents a convexity, in the lower jaw a concavity."—*Dr. Black.*

"The teeth do not occlude on a straight plane; both arches have a decided dip, the greatest depression being between the first and second bicuspid."—*Dr. Starr.*

"The line of the cutting-edges must not be straight, but a double curve, dropping in front and elevated at the back."—*Dr. Kingsley.*

But whoever will examine the illustration which this author adds to his statement (see his book, Fig. 347) will become convinced that this is no true "type of a well-developed upper jaw," because the bow should not be deepest at the centrals and higher (toward the gum) at the bicuspid, descending again over the first molar in order to rise suddenly, but just the reverse,—*i.e.*, deepest at the bicuspid,

ascending a little toward the centrals, and even more toward the third molars.

Length of Arch.

"The average arch measures about 127 mm. (five inches)."—*Dr. Black.*

The measurements made by Dr. Black show that the sum of the mesio-distal diameters of the crowns of the upper arch is only by one and one-half mm. larger than that of the lower arch.

"The upper arch is larger than the lower."—*Dr. Parreidt.*

"The crowns of the teeth of the upper jaw generally describe a rather larger arch than those of the lower."—*Dr. Harris.*

(To be continued.)

A REVIEW OF DR. OTTOLENGUI'S BOOK, "METHODS OF FILLING TEETH."

BY MAX GREENBAUM, D.D.S., PHILADELPHIA, PA.

(Read before the D.D.S. Society, Philadelphia Dental College, February 3, 1893.)

MR. PRESIDENT AND GENTLEMEN,—In the DENTAL COSMOS of last year appeared a series of articles on "Methods of Filling Teeth." On the plea that existing text-books are largely compilations, and thus embrace varied theories and practicalities, which bewilder rather than instruct students, these articles appear in book form. Yet we venture the remark that to be bewildered is not so bad as to be mis-instructed.

Free expressions of experiences are accepted universally as advantageous to progress in knowledge. No less is this so in our profession; and the more these expressions clash with each other, the more vigorous the stimulation to progress. Yet knowledge cannot go on clashing forever with pre-existing knowledge; that would indicate no progress. There must be a line of demarcation that sets off certain portions of any knowledge, and makes so much of it positive and unalterable; in other words, gives it scientific foundation; and in degree as it may possess this foundation, so is it esteemed scientific. To advance individual methods in total disregard of the scientific procedure gives those methods absolutely no value, and so far as they may serve as teachings the informed student laughs them into the erroneous position they are forced to occupy.

We may state, then, at the outset, that we do not assail some of the methods essayed in the author's work because we practice different ones, or because any one else may do so, but *because they clash with that portion of our profession that is scientific, and if accepted by students as it is intended they should be, they would in so much derogate from the scientific value of dentistry.* The controversy, then, is strictly and entirely a scientific one. We may, too, state here that the author recites methods, and expresses criticisms upon methods in vogue, which we pass by. They are of a nature that do not concern the standpoint from which we review the work. For instance, in deprecating the use of matrices in filling-operations, the author states that he can produce better results without their use. But that has no scientific value. There are prominent practitioners, who rank very high in the pro-

fession and are thoroughly conscientious, who advocate the use of matrices. Still, all this is foreign to the standpoint from which we criticise. We disregard all that which depends more upon personal adaptability, habit, and fitness, and confine ourselves to that portion which is expressed in contradistinction to what *scientific dentistry formulates*.

The first statement expressed in this distinction is found in the following: "If decay occurs along margins, it is because those margins were improperly made, either as to shape or position, or else because the filling was unskillfully inserted or finished." How misleading this assertion is! Decay may occur along margins because the operator was at fault, but that it does so always is not true. The student who perchance may observe that portion of the author's work, and not knowing otherwise, naturally becomes imbued with the fallacy that all failures are due to defects in the insertion of the filling or preparation of the cavity; and early in practice, as he may observe how in spite of best endeavors failure ensues, he is ready to despair because he does not possess better qualifications to follow his profession. But providentially a patient presents himself with fillings introduced by other operators, and pathetically remarks that every few years these front teeth have been filled and refilled; and as the young practitioner observes, he begins to feel he is not as bad as he thought he was, and *if* he be a poor operator, there are others who are as poor, and they include operators of the highest standing. This affords consolation, but consolation is not always satisfactory. To the inquiring mind in this relation it would be very unsatisfactory. Such a mind would search and finally ascertain that teeth will fail.—not because margins were improperly made, or because the filling was unskillfully inserted, *but because those teeth were filled with gold*. Inasmuch as we have this knowledge, so much of the author's book is misleading to the beginner and valueless to the informed man.

The writer ventures next to assail the propriety of leaving decayed dentine in cavities. He asserts that high authorities appear in favor, in certain cases, of leaving portions of decayed dentine over the pulp, and then follows immediately the statement that "this is a grave error." Does the author place himself beyond high authorities? To do so requires greater warrant than mere words give. In support of his position he states that in a few cases he permitted decayed dentine to remain within the tooth, and that in every case he afterward removed the fillings on account of a *bluish appearance*, although the filling was perfect. This to him was conclusive that decay was progressing as a result of the decayed dentine left over the pulp. Yet Dr. Miller mentions in his chapter on the "Etiology of Dental Decay" the discovery of Leber and Rottenstein (which we quote, not because we recognize the value of the authority, but because espoused by the author himself): "After boring into two incisors which had a peculiar *blue color* without exhibiting a trace of decay externally, the entire interior of the teeth was brown, completely softened up to the enamel, and that even the root was hollow." Dr. Miller then states that such exceptional cases "must not be identified with common caries." They are of such rare occurrence that no satisfactory explanation of them has as yet been offered. There may be no similarity between this condition and the author's, yet on the

other hand there may be ; but the conclusion the author draws, that "a perfect filling will not stop decay if carious dentine is left in the cavity," is not warranted. As long as high authorities maintain that decayed dentine left within cavities produces beneficent results, and verify their statements, as we can only do from practice, and as long as we know that very frequently the removal of decayed dentine, in the great desire to establish anchorages for fillings, results disastrously to the pulp, it is better that we follow such practice. The author recites *in support of his position* recent reports from Professor Miller, showing that germicides are ineffectual unless left in contact with carious matter much longer and in greater quantity than has been our practice ; yet we can see no such support in the foregoing. Supposing our practice has been to attempt the sterilizing of carious cavities in a minute, and supposing the work of Professor Miller demonstrates that sterilization is not complete until after the drug has been left in contact with the carious matter for an hour, still that is no support to the position that carious matter should be removed entirely. It simply demonstrates that carious dentine does not become sterilized unless in contact with germicides for a certain time. However, experiments have shown that although carious matter is left within the cavity, and that although *no agent has been used* to destroy the micro-organisms in carious dentine, yet no decay continued, and that such pulps lived, and that such teeth were preserved,—and the experiments of hundreds of operators for more than a score of years have demonstrated this. Yet another point may be adduced, but that is concerning the treatment of carious and disintegrated dentine ; and as the author makes no mention of it we must pass it by. But certain it is that as long as high authorities maintain the stand that much good accrues from the practice of leaving decayed dentine over pulps, instead of its being a grave error to follow such practice, it appears to be a grave error *not* to do so,—and so it is.

In the beginning of his work, the author makes use of the expression, "When the cavity is filled scientifically," yet nowhere in the entire book does he demonstrate more clearly that he forgot to include scientific considerations than in the section treating of filling-materials. Scientific dental knowledge implies more than the ability to *introduce a filling and make it look well after its insertion*.

In speaking of gutta-percha, the author remarks "that it is useful in many ways, but perhaps most useful for temporary purposes." This certainly is beneath any scientific conception of the material. From the observations of a very high authority we have the statement that gutta-percha, properly used, is the most *permanent filling-material* we possess. And if we do not accept this assertion, owing to its empirical foundation, we can go farther and find direct scientific corroboration of it. But why should we not accept the teachings of one conceded an authority? Men who limit themselves to certain lines of work know more about such work than others whose work is less specialized. This is so generally. Still, so firm has the basis of the new school in dentistry been made, that *science* underlies *empiricism*. Results of years of special work are not presented alone in support of certain practice, but in addition the supporting facts of science.

To confirm the remark that the author's proposed teachings are in

contrast with *scientific* knowledge, we need but read on. Throughout the space devoted to gutta-percha he speaks about temporary stopping as though it were a grade of gutta-percha, and intermixes a statement concerning the one with a statement appertaining to the other, which only little knowledge of either could prompt; such information, for instance, as this, "The temporary stopping furnished at the depots, which is a combination of *gutta-percha* and wax," shows at once the meagerness of the author's information.

Again, he states that "much of the reported failure of gutta-percha as a permanent filling may be referred to faulty manipulation," and then proceeds to give what to him appears as the proper manipulation. He recommends that *preferably it should be heated over warm water on a glass tray*. To this we say that the best fillings are made from such material as gives the highest heat-test with the least admixing of inorganics, and that such material does not become sufficiently plastic under the condition recommended by the author to be manipulated at all. We cannot pass these proposed teachings, given in contrast to the *correct* knowledge available on the subject, without observing that all the adverse criticisms imposed upon plastics usually arise from *would-be* authorities, who in reality *know least*. This best explains experiences that are written to serve as teachings, when such experiences differ so decidedly from what we know on the subject. And it explains, too, the statement that "as a permanent filling gutta-percha may frequently be depended upon"!

Maybe if the years of work that have been conscientiously spent in formulating the results about gutta-percha had been in accordance with the author's present stand, then he would perhaps maintain that gutta-percha, properly used, is the most permanent filling-material we possess, and then he would have been right. As it stands now, we can say, *Practically we know better*.

The author's next venture is upon cements. In speaking of oxychlorid, he says, "As a permanent filling it is doubtful whether there are any conditions in which it is to be preferred to oxyphosphate" (misnomer). Since the introduction of *zinc phosphate* the oxychlorid is never used as a filling-material by the scientific exponent of dentistry. We understand the effect the fluids of the mouth exert upon it too well to insert it as a filling-material at all, and as far as there being any conditions which make it preferable to zinc phosphate, there never were such conditions, and there never will be any. Oxychlorid may be inserted in hypersensitive cavities to obtund sensitive dentine in preference to zinc phosphate, but we are speaking of filling-materials, and not of substances employed for the obtunding of sensitive dentine. On the same page the author remarks, "It is hazardous to depend upon oxychlorid as a permanent filling in cavities near the gum-line," to which we say, firstly, we would never use oxychlorid as a filling-material, and secondly, even admitting its *possible employment* for stopping a cavity, we possess the necessary information that would preclude contact with the gum-line. Even the zinc phosphates are *guarded* when as fillings they approach the cervical margin, because we understand the relation between this *vulnerable spot* and filling-materials,—a relation that disintegrates filling-materials when they are *positive* to tooth-bone, and destroys tooth-bone when it is *positive* to filling-material.

And yet more grotesque is the statement that instructs, "to smear the wall with the fluid, and then blowing the powder against it with a chip-blower, we obtain the thinnest imaginable layer, where it may be advisable and needful to utilize as much of the cavity as possible." We repeat, *We know better*. We can mix oxychlorid *properly* and yet obtain the thinnest imaginable layer, and *pellet*, not *smear*, it against the cavity.

It appears as though we are pursuing a phantom in endeavoring to find something stable on cements in this chapter. As the author *instructs students* about "*oxyphosphate*," we feel as though we should give up the pursuit. The author states, "As much depends upon the manner of manipulating the material, I will explain how best to mix it," and then the attempt is made to instruct how best to mix it. He says, "If a permanent filling is desired, put the powder and liquid on the slab separately with a clean, smooth spatula, stir a little of the powder into the liquid until it is incorporated, producing a thin but well-mixed material, add more and more of the powder until a thick, smooth cream is produced. This, of course, is still too thin to be used as a filling, *but no more powder must be added*" (and this, too, the author has in italics). We recognize that the more powder we succeed working into the least quantity of fluid, the better the mix. It responds better to all the tests for a good mix, and makes a better filling. We do *not* mix a *little* of the powder at a time, and then add *more and more*. But maybe we can reconcile this difference, in practice, by the thought that the author innocently has been using *zinc phosphate*, while he supposed he was using *oxyphosphate*! This is merely a thought, yet it may explain matters, and likewise this *peculiar* innocence may explain the sentence, "May not some of the failures recorded against the material be more properly attributable to its faulty manipulation?" *No doubt they can!*

Before passing the subject of cements, let us go over a portion of the author's work which is treated in another section of the book, but nevertheless which we introduce here because it has a certain relation to cements, and because it confirms the conclusion that much of the author's book is *decidedly deficient*.

The author describes his treatment of two incisors, a central and a lateral. After preparing the cavity in the central, he found but little dentine over the pulp. To *insure the safety* of this organ, he applied a layer of *phosphate cement* over it and filled the tooth with gold. He then proceeded to treat the lateral; here he was compelled to devitalize first. After accomplishing this, the patient reported "*continuous and excessive pain at night*." The author did everything to allay the *mysterious* suffering, and it was not until a week afterward that the *patient* was able to say positively that the pain was in the *central*, and not in the *lateral*. The author then states that "reluctantly he concluded that the presence of so much gold so near the pulp, even protected by the '*oxyphosphate*,' had resulted in a pulpitis." He then drilled into the central and removed the pulp. *And all this is written in the greatest innocence and candor*. It is evident the mysterious suffering, which the author could not allay, was but a natural outcome that would have been recognized by any ordinary diagnostician without the patient suffering for one week.

There is one remark the writer indulges that is perhaps the most

credible thing in the entire work, and that is, "Amalgam is one of the most valuable filling-materials at our disposal." However, as we read on the characteristic deficiency presents itself. The author states that amalgam should be introduced into cavities under dry conditions, that the admittance of moisture has much to do with the blackened condition of the filling. Evidently the fact that certain alloys can be worked though the cavity be flooded with saliva, without interfering with the usefulness of the filling, is not known by him, as likewise the fact that a blackened surface expresses a quality about amalgam that is most desirable. It indicates tooth-conserving attributes, and in proportion as it possesses tooth-conserving qualities so it is desirable. That is the standpoint from which we are influenced, and which makes one amalgam excellent and the other good for nothing.

In mixing alloys, the author writes, "I prefer adding the mercury a little at a time, until a plastic mass is produced, rather than to use too great a quantity of mercury at the outset, and then depend upon expressing it." We can say again, *Practically we know better*. Those conversant with the subject have no fear of using too much mercury. They understand what proportions are *just right* with each mix and with each alloy, according to conditions, and know just *how* to do the correct thing. The reason the author deprecates expressing mercury from a mix is because, if the mercury squeezed from amalgams be examined, it will be found to contain a *considerable* proportion of metals from the alloy. *But practically we know better!* We understand, should it be desirable to make a mix of amalgam as soft as *cream*, it can be done, and yet enough mercury expressed, *without interfering with the proportions of metals in the alloy to alter its workings*, to make the filling *hard*, while yet the patient is sitting in the chair.

In deciding in what cases to use amalgam the author directs, "It would be a wise rule to rigidly exclude amalgam from incisors and cuspids." That is unscientific. A rule that directs appreciation of conditions, and then the use of whatever these conditions *require*, appears less unscientific, and, it seems, gives operative dentistry a much firmer basis, from the standpoint of *tooth-salvation* at any rate.

The manner in which the chapter on amalgam is treated leads one to suppose the author knows only of *one* amalgam, and if he knows of more he permits no such inference from his work. The chapter is handled in an exceedingly uninformed manner. With the exception of a few lines devoted to copper amalgam, no reference is made to any special kind. In a work intended for instruction, it appears a material which, according to the author's own words, "is one of the most valuable we have," should receive more treatment. He might have spoken of what constitutes a good alloy, what makes a poor one; he might have recommended, as long as his intentions are to instruct, what alloys should be used; he might have explained properties of amalgams, different tests, and so on. Yet *what is*, is in part antagonized by the consolation it affords to know that many could have written, *as it might have been!*

In speaking about the claims made for the therapeutic value of copper amalgam in cavities, the author asserts, "Practice has not substantiated the claim. Copper-amalgam fillings from the hands of

practitioners known to me clinically as expert operators have come under my observation leaking badly," and this he offers as proof of his assertion. Perhaps we can do no better than simply state that from clinical experience it is shown that copper amalgam possesses marked antiseptic action.

Passing over a portion of the work,—as it does not encroach upon scientific dentistry,—we come to the author's instructions and criticisms upon canal-dressings. He states that the most despicable thing to leave permanently within a tooth-root is cotton. He speaks of cotton dressings removed by him that were as vile as anything that had ever assailed his olfactories. Teeth have been opened where the canals were filled with *cement* that emitted *odors* that could not be *surpassed in their vile intensity*, and teeth have been opened where the canals were filled with *chloro-percha* that did likewise, and some with cotton that did the same. Practice demonstrates this to be the *probable sequence*; and that is one of the strong points why canals should be filled with cotton, because then, should trouble arise, they can be vented *through the filling*, and relief administered to the patient. *But canals do not emit odors that are as vile as anything that ever assailed the author's olfactories because those canals were filled with cotton!* The author might have known that.

Passing these criticisms, we come to a method for which the author claims originality. He takes a piece of floss silk, waxes it thoroughly, after which he dips it into chloro-percha and cuts it into pieces about an inch long. These he utilizes as canal-dressings, claiming that they are readily packed into canals, and the end being allowed to extend beyond the orifice of the canal, is readily grasped, in case of need, with a pair of tweezers, whereupon the whole root-filling is easily withdrawn. But how about the filling in the tooth? What does the author do with it? He must drill it all out to get at his canal-dressing, and in doing so *there is danger in forcibly withdrawing* the rootal filling, which in itself is sufficient to bring about pericemental inflammation. Then, again, we must consider the various difficulties that surround the drilling out of metal fillings when we have an incipient or pronounced inflammation.

Comparing the author's method with the method established in practice, which we had the pleasure of discussing at one of your former meetings, and which, therefore, we will not go over again, we can say only that if the author says such method is despicable *his own is more so*. Of necessity it must fall short when compared to directions that resulted from careful considerations of conditions, and disclose *best means* to meet those conditions when they become antagonistic.

And now, on the whole, we feel as though we must say the author's work is deficient. Had such a book been presented to the profession twenty or fifty years ago, it would have been looked upon with *less suspicion*. Then dentistry embraced little, comparatively speaking. The plastic school had as yet no scientific foundation. Tooth-salvation was not the practice then; it is now. Twenty years ago the greater portion of dentists believed in *one* material. But even then, like all the work of *evolution*, slow but cumulative, that one material was being whirled into a position of *grave distrust*. To-day the practice with the *scientific* dentist is *tooth-salvation*.

EXTRACTING TEETH, AND CONDITIONS WARRANTING SUCH PROCEDURE.

BY JOHN D. THOMAS, D.D.S., PHILADELPHIA, PA.

(Read before the First District Dental Society, State of New York, February 14, 1893.)

MR. PRESIDENT AND GENTLEMEN,—To present this subject seriously before an intelligent body of men for consideration may seem like going back to the dark ages of dental history, when the extraction of teeth was nearly the sum-total of dental knowledge. To some of you, no doubt, such an operation may be regarded as obsolete, in the present degree of attainment in the science of dentistry.

The rapid strides made in the advancement of our profession during its modern history are unparalleled; and since the watchword is assumed to be the saving of human teeth, it is not surprising that tooth-extraction, as a means of relief to the suffering, should be condemned by many, and regarded as absolute malpractice by a few who assert that it is possible to afford relief and save every tooth without resort to the extreme measure.

It may be granted that the dentist can take a patient, say from five to six years of age, with normal health and favorable structural conditions, and with proper care on his part and constant attention by the patient, save perhaps every tooth to good old age, except it be necessary during the youthful period to extract one or more for purposes of regulation. So if all dentists were of equal ability and patients were up to the same standard of systemic condition, and all were inclined or compelled to give attention to their teeth, we might be justified in claiming that tooth-extraction was an unnecessary operation in the practice of dentistry. Unfortunately, such is not the case. Dentists seem not to have reached an equal degree of success in saving teeth, and patients have not the same constitutional advantages in tooth-structure; and further, but a small percentage of the whole population give any consideration to their teeth other than to have them extracted when they ache.

Admitting that those of strong structural constitution, in the hands of the skillful dentist, need have no fear of extraction, that class may be dismissed without further consideration; their number is few in the vast army of patients who require dental services.

The great mass of people in civilized countries comprise those whose dental organs are in need of constant attention to preserve them to a moderately prolonged degree of usefulness. These are the people whose teeth are defective in their primary formation, and whose constitutional tendency is to rapid decay; or, in other words, those whose teeth are exceedingly susceptible to the ravages of the micro-organisms of the mouth, and whose physical conditions are conducive to the inflammatory processes so often developed through their agency. To produce uniformly good results in these cases requires the best of skill on the part of the dentist and constant care and attention by the patient, two very important factors which are not always practically attainable.

It matters not how skillful the dentist may be, many of this class of patients call upon him only when compelled to do so by evidences of pulp-exposure, pericementitis, or incipient abscess, at which time the

successful outcome of his best efforts is clothed in doubt. Others, again, after having spent much time and money in the preservation of their teeth, with only moderate success, give up in despair or disgust, and conclude to let them go without further care, and finally have them extracted and resort to an artificial denture.

But the great and prolific source from which comes the necessity of extraction is the large number of people who never go to a dentist at all, except to be relieved of toothache by the only process they know or may care about.

In order to obtain, if possible, an approximate estimate of the number of people who are under dental care, your essayist has inquired of a number of dentists in Philadelphia, who have probably the largest practices in that city, as to how many patients each will operate for in a year, and it is found that the maximum number of individual patients for each would average about four hundred. This does not mean engagements,—for one patient might fill twenty or more appointments,—but that many separate people. There are in our directory the names of four hundred and eighty dentists, to a population of one million two hundred and fifty thousand which our city contains. This gives us about 14.5 per cent. of our people who receive dental services annually. Upon the same basis of calculation,—assuming that every dentist operates for four hundred, which is doubtful,—in the whole country we have a population of sixty-five millions, and in round numbers eighteen thousand dentists, which shows only about 11.1 per cent. of the entire population of this country to be annually under the care of the dentist. What proportion of the remaining 88.9 per cent. of the people may suffer from toothache and resort to extraction as a means of relief, we have, of course, no way of finding out, but enough is shown to satisfy us that extraction is yet a very important factor in dental practice, as an aid for the relief sought by many people who represent that large class of individuals whose teeth, either from lack of care or unsuccessful dental treatment, have passed beyond the bounds of preservation.

From the earliest history of dentistry the operation of extraction has been recognized as a means of relief, and all sorts of appliances and implements have been devised for the purpose and evident intention of performing the operation with as little pain and inconvenience to the sufferer as possible; yet, as we look back at some of the instruments employed in earlier times, it seems difficult to reconcile the theory with the practice, for it would be almost impossible to construct an instrument more barbarous than some of them,—the old-time key, for instance,—both in causing pain as well as injury to the surrounding parts.

Nor are many of the instruments of more modern date a very great improvement upon those of ancient times. We believe that the objects to be obtained in the construction of a pair of forceps are, first, that they shall grasp a tooth so firmly and securely that every movement made by the hand shall be transmitted without loss of motion or effect upon the tooth, and that all force to be applied shall be as nearly direct as possible; yet, as we look over the catalogues of the dental manufacturing companies, we will find so many of diverse utility, such curving of handles and serrated beaks, that with such it is an utter impossibility to apply direct force or to firmly and securely

grasp a tooth, and, as a consequence, it is no uncommon occurrence for those who make a specialty of extracting to receive patients with the warning that Dr. So-and-So, while endeavoring to extract this or that tooth, failed to remove it after applying his whole strength, when in reality the tooth may have been no more difficult to extract than plenty of similar cases which present themselves daily.

The upper molar forceps need serrated beaks, the outer one pointed so as to insert itself between the buccal roots at the bifurcation ; so also with both beaks of the lower pair. For the other forceps serrated beaks are an abomination, for the reason that during some of the necessary movements it is an impossibility to hold a tooth without turning or slipping. If the beaks are made with sharp cutting-edges, they will hold so securely that every motion exerted upon the tooth will exert its effect with half the force, and consequently less injury will result from the strain.

To the treatment of the after-effect of this strain in extracting I wish to particularly invite your attention.

It is surprising that every one who has written upon this subject, so far as I have been able to find, has seemed to regard the extraction of a tooth as the end of the whole matter, for not one of them refers in any way to the treatment of possible difficulties after the tooth is removed. Yet it would be as reasonable for a surgeon to amputate a hand or foot and dismiss his patient as thoroughly cured, as for a dentist, under some circumstances, to finally dismiss his patient immediately after extraction. Perhaps by the majority of our profession little is understood of the nature and treatment of these cases, but the ignorance of the average physician upon this subject is simply dense. Many patients, if they still suffer pain or soreness after a tooth is extracted, will call upon their physician, who, not knowing any special treatment, will apply general principles for the reduction of inflammation. Should there be swelling, one will go a poultice, with the result, perhaps, of drawing an abscess to the cheek. In such instances the patient usually feels aggrieved with the dentist, and sometimes wants damages for what is really the result of the medical treatment.

A case came up in the courts of our city not long ago, in which, with a number of dentists, I was subpoenaed as a witness. The dentist had, after much difficulty, extracted an impacted wisdom-tooth. There was pain, soreness, and swelling afterward, which was treated by her physician in the way alluded to, with the usual result. The physician complained that in extracting the tooth the dentist had lacerated the gum severely, and must have almost broken the jaw by the operation ; yet, in describing his treatment, he said he had still further lacerated the parts by puncturing the gums at least a hundred or more times with a bistoury to produce blood-letting, and had poulticed the outside of the cheek. He had not once thought of syringing the socket to rid it of accumulated putrescent matter, or of applying hot fomentations in the mouth, using antiseptic dressing or washes. The verdict for the plaintiff was one cent damages. In my own practice troubles of this kind have been avoided by recognizing the cases which are likely to need after-treatment, and giving explicit directions in regard to them.

Since the introduction of nitrous oxid gas for painless extraction, it has been the means of transferring, in a measure, this branch to

those who make a specialty of it, which is to the mutual advantage of both dentist and patient. By this method the teeth are extracted by one who, from constant practice, is enabled to remove them more expeditiously, and by his expertness will exert less force and unnecessary motion, consequently there is not so much soreness and pain as an after-effect.

In the early days of nitrous oxid this kindly healing of the gums was attributed in part to the effect upon the blood of the extra equivalent of oxygen which nitrous oxid contains compared with the normal atmosphere; but since it has become known that nitrous oxid does not give up any of its oxygen, that it is taken up by the blood just as it enters the lungs, and is expelled in the same condition, the good results of this process can be ascribed only to the care and neatness of the expert.

Notwithstanding the expedition and care with which the operation is performed, there are some conditions in which extracting a tooth not only fails to give immediate and effectual relief, but carries with it a certain amount of injury, which is deserving of more consideration than the profession at large has heretofore been inclined to give it.

The cases causing injury are those of exostosis, large and divergent roots, and malposed wisdom-teeth. Those which fail to give immediate and effectual relief are cases of pericementitis, incipient and alveolar abscess, and impacted wisdom-teeth in inflamed surroundings.

There is one other condition the treatment of which I have never seen described or recorded,—and that is severe facial neuralgia, which evidently starts from an inflamed pulp, continuing with no abatement after extracting the offending tooth. To me these cases were for a time most perplexing, for where reflex and neuralgic pain has existed from such a source it would seem that relief should be expected at once—almost to a certainty—after extraction; and yet in some instances there will occur a continuance of pain as severe as before, which is liable to lead us to assume that the patient is suffering from neuralgia independent of the tooth or teeth. My first experience of this kind exhibited perfectly sound teeth, upper and lower, with the exception of the left lower wisdom, which had an inflamed pulp. The patient had never been subject to neuralgia in any form, so the extraction of the tooth was confidently expected to give immediate relief. What was my surprise to have him return the next day declaring that the pain was even more severe, if possible, than before. There was no inflammation about the parts, no putrescent matter in the socket, and the only explanation seemed to be that there might have been some disturbance to the inferior dental nerve, which was in close proximity to the root of the tooth at that point. In syringing the cavity and wiping out with cotton, there was a place which when touched excited pain as severe as an exposed pulp might do. I applied nitrate of silver, and he had no further trouble with it.

Dr. Kirk described to me a similar case in his practice. The patient, a lady, had suffered severe neuralgia for some time, complicated with a catarrhal discharge from the ears and partial deafness, both of which were coincident with the neuralgia, and for which it seemed impossible to discover a cause from appearances in the oral cavity. Finally he concluded there must be exostosis at the roots of the lower wisdom-teeth, and, though an experiment, their extraction was

recommended, the superior wisdom-teeth being absent. The operation proved the correctness of the diagnosis as to the exostosis, for both teeth presented roots greatly enlarged, and relief was confidently hoped for. In teeth of this character, however, the strain necessary for their removal is apt to excite more or less inflammation, and the pain continued with increased severity for forty-eight hours. During the paroxysm he applied a minute quantity of strong carbolic acid directly to the bottom of the sockets, and the neuralgia instantly disappeared, never to return.

To satisfy myself as to the proper diagnosis of such cases, with a number of similar ones I split the tooth to see if we could discover more fully the true condition of the pulp. In three instances I have found a portion of the pulp broken from one-sixteenth to one-eighth of an inch within the canal, which had evidently pulled through the apex and remained in the socket, causing this after-pain. Even when there is no evidence of a portion of the pulp remaining, there is no doubt of irritation at the point of union between the tooth and the maxillary nerve, sufficient to produce a continuance of the original affection. I have found the application of the silver nitrate effectual in all these cases.

With exostosis, and large and divergent roots, the force necessary for their removal is sometimes equal to all the strength the operator can bring to bear, and it is unreasonable to suppose that this amount of strain can be applied without some inflammation following. Here is where the systemic condition of the patient must be considered. There are many so constituted that any wound heals very readily by first intention. If no broken or displaced process has been allowed to remain to cause irritation, the place will soon heal, and will be materially aided by the use of antiseptic and astringent lotions. But in a great number of people local disturbance so severe as the extraction of a tooth of this kind is sure to be followed by an exhibition of the inflammatory process, more or less serious, according to the severity of the operation and the systemic condition of the patient. When the bone has been distended and strained, as is unavoidable in many of these cases, actual osteitis will result, and the inflammation is accompanied with pain more severe than the original toothache; and I wish to direct attention to what is, in my experience, the best method for its speedy relief. Antiseptic and astringent lotions are generally recommended as after-treatment in extraction, on the ground that the original cause of the trouble being removed, stimulating and astringent washes will facilitate nature's efforts to heal the wound, when in reality a greater cause remains in the strained and bruised bone which surrounded the tooth, and any effort to abort the progressive course of the inflammation by means of antiseptic treatment will only result in more severe and prolonged suffering. I always recommend the application of hot water as soon as practicable after the operation. Should inflammation ensue sufficiently to produce pus, the more speedily it is accomplished the better; and should such not be the case, the hot application will act like magic in easing the pain, relieving the congestion, thereby diffusing the induration, and rapidly establish the normal circulation through the parts.

In malposed wisdom-teeth the effect of extraction is, if anything, more severe, for the reason that they grow from solid bone with no

alveolar process about them. From the proximity of their position to the angle of the jaw, the soft tissues of the throat are apt to become involved, sometimes accompanied by swelling, which if left to itself would form an abscess most serious to control. I have never met a case that did not readily yield to the hot fomentation, with the addition of a compress of cold water or Pond's Extract to the outside, thereby drawing and driving the accumulating pus into the socket. As soon as that is accomplished, relief is certain; and if the cavity is kept clear of the accumulation of putrescent matter, by syringing with warm water or the use of hydrogen peroxid and the application of antiseptic dressings, recovery will be speedy.

In cases of periostitis and alveolar abscess, the conditions imperatively demand this treatment, and in my judgment it is the proper course to pursue after extraction. Alveolar abscess is invariably followed, to some extent, by necrosis, which may require weeks to get rid of. Beside the necessary precautions as to cleanliness of the cavity and the antiseptic treatment, the daily application of a ten- or fifteen-grain solution of the zinc sulfate is required until the sequestrum is removed or absorption takes place.

The writer who prepared the article upon extraction for the "American System of Dentistry" condemns the removal of a tooth while it is aching, or when the patient is in a weakened state; but in my experience a diseased tooth should be extracted at any time when you are called upon to do so, for the reason that continued suffering will bring a nervous and delicate patient to the verge of absolute prostration and collapse as one result, and the retention of such a tooth will be liable to, and probably will, involve further injury to surrounding teeth and parts. A tooth which is the cause of so much suffering and injury will cause less of both out of the mouth than in it, and the consequent condition can be better treated without it.

The error of allowing a diseased tooth to remain too long is frequently demonstrated in the practice of any one who makes a specialty of extracting. There was recently brought to my office, by his family and consulting physicians, a young man suffering with severe alveolar abscess upon the root of the right lower first molar. The second molar, they said, had been extracted about ten days before, with no relief resulting therefrom. The inflammation by this time had extended from the wisdom-tooth anteriorly to the cuspid, with evidences of necrosis about the first bicuspid. I recommended the removal of the first molar and both bicuspids, hoping it would arrest the progress of the disease, though personally I was in doubt about saving the cuspid. I have found, in cases of progressive necrosis, that it is necessary to remove at least one tooth beyond the line limiting the inflammation, but in this case we all desired, if possible, to save that tooth. Upon operating, I found the root of the second molar had not been extracted, and was the origin of the whole trouble. This, together with the teeth above mentioned, was removed, and the bone found perfectly necrosed from the wisdom-tooth to the septum between the bicuspids. Hope was entertained that the disease would go no farther, but in a week the physicians brought him back with the characteristic blueness and spongy condition of the gums extending to the right central incisor, which necessitated the extraction of the cuspid, lateral, and central, and cutting away of the process.

The parts were healing nicely where the former operation had taken place. Within a week a third visit was made, with the disease extending to the left cuspid. The patient by this time was very much run down, and fears were entertained for his recovery. I urged that this operation should include both the left bicuspid, though they did not show any evidence of disease. With this we succeeded in checking its progress. The poor fellow had lost twelve teeth and the whole alveolar process about them, as a result of allowing the root of one abscessed tooth to remain.

Such extreme cases are comparatively rare, though it is no uncommon occurrence for an alveolar abscess upon one tooth to involve the adjoining teeth on either side of it, together with the surrounding bone, which invariably results in necrosis to a greater or less extent; and very frequently when such a tooth is extracted and the parts are apparently healed, we have in those adjoining teeth dead pulps, which will prove to be the unsuspected source of future trouble. Such a case was recently referred to me by Professor W. W. Keen, of Philadelphia. The patient was a young man who had had an abscess upon the root of the right superior second bicuspid, which broke upon the outside of his cheek. The tooth was extracted, but the discharge continued through the fistula upon the cheek for some seven months, when evidence of antral disease appeared from nasal discharge. The teeth were apparently sound, nor was there any indication of disease in the mouth, and the discharges were attributed to necrosis of the maxillary bone, an operation for which had been arranged at the Jefferson Hospital. Under a strong light, the first molar next to the tooth which originated the trouble exhibited the characteristics of a dead pulp, and extraction was recommended. The root was covered with a mass of abscess-tissue that would fill a hazelnut-shell; it had destroyed the floor of the antrum and caused the discharge through to the nose and the fistula on the cheek. It is needless to say recovery was rapid and complete. Here, again, are shown the evil results of allowing a diseased tooth to remain when extraction was strongly indicated.

It will no doubt surprise you when I say that these extreme cases occur less frequently with people who have never been under dental care than with those who belong to our constituency, for the reason that most of the former, when suffering from a defective tooth, prefer immediate relief by getting rid of the source of their discomfort.

This leads me to a point where I wish to disclaim any personal allusion or criticism, but it is one upon which I have grown to feel deeply, and that is the system of prolonged treatment of alveolar abscess which has persistently failed to respond. Dr. Black, in his article in the "American System" (I quote from that great work because it claims to express the most recent thought upon all matters pertaining to dental practice), speaks of the treatment of alveolar abscess and the possibilities of saving dead and diseased teeth, and refers to clinical cases, in one of which, for necrosis that followed an abscess, he removed the alveolus from the surfaces of three teeth, with the septum between two of them, and was much gratified some time later to find the teeth in perfect condition, with the bone fully restored about them. This may have proved successful in his case, but in how many could such a result be insured, and for how long? He

further cautions us to guard carefully the pulp-chambers of such teeth as have lost their pulps, indicating his recognition of the fact that an abscess which will inaugurate necrosis, that will extend over two, three, or more teeth, will also destroy the pulps of those teeth, and it becomes a serious question whether we are justified in the retention of one tooth which will induce such havoc to its surroundings, when timely extraction would have terminated the matter.

Such teaching is intended to establish as a principle and system the practice of always treating alveolar abscess indefinitely, no matter what may be the systemic state of the patient or how bad the local condition. As remarked before, there are some patients with whom such a course of treatment might prove successful, for their systems are in such excellent condition that they will not readily succumb to septic infections; but where we may find one who responds so satisfactorily, we are as likely to find at least ten for whom such a procedure would prove exceedingly dangerous. It is the coming in contact with so many who have shown the dangerous tendency that has led me to present the following cases, which have been the victims of this policy of practice which claims to save everything.

Case 1.—A lady, forty-five years of age, with a perfect set of teeth above and below, had had the right superior second bicuspid filled some years before. Living in the country, she did not have her teeth examined regularly, and was surprised when she felt discomfort in the filled tooth. Her dentist found the tooth decayed beyond the filling, and the pulp exposed. Application was made to destroy it. Pericementitis and alveolar abscess followed, which was impossible to relieve through the canal. Ginger plasters were applied, which induced the discharge through the gum. The bone became necrosed, and extended from the cuspid to the wisdom-tooth, involving the loss of both bicuspids, the first and second molars, and surrounding process, besides producing disease of the antrum which required three months of treatment before she was cured.

Case 2.—A gentleman, thirty-eight years of age, had had the left lower second bicuspid treated by his dentist successfully, and was comfortable for several months, when trouble again ensued. The filling was removed, and a discharge through the canal obtained. Relief was complete, and the tooth again treated and filled, to remain in this instance some five months, when for the third time it became rebellious. The filling was removed, to his great relief, and hope was still entertained that the tooth would be saved; but the inflammation was communicated to the first bicuspid, and his dentist recommended extraction. Necrosis followed, which resulted in the loss of the first molar, first bicuspid, cuspid, and lateral incisor teeth, in addition to the second bicuspid, which originated the disease.

Case 3.—A lady, about fifty years of age, had had the right inferior first molar treated for abscess some three years before, a fistula forming at that time on the gum, which continued for several weeks but finally disappeared. The tooth had at intervals grown sore, but had subsided. Once it was necessary to drill to the pulp-canal to give vent. Finally a severe abscess occurred, involving the second molar and the second bicuspid, also the outer plate of process for about an inch. Though the adjoining molar and bicuspid were previously sound, the pulp was destroyed in each of them.

Dr. Kirk recently presented to the Odontological Society of Pennsylvania his experience in a case which nearly cost the patient his life. From an abscess upon one tooth, which was extracted, the septic poison developed a phlegmonous bed of corruption which caused discharges of pus from various openings on the cheek, neck, and in the throat for about three months. He discovered a lifeless pulp in an adjoining apparently sound tooth, which he had not before suspected. After its extraction, recovery was complete. During the discussion of the above case, Dr. Darby related a case in his practice in which he had made an opening through the root of an upper central for abscess, for a gentleman for whom he had placed an artificial crown a few days before. The gentleman became seriously ill, and two days later his death occurred, from what the physician stated was blood-poisoning communicated by the tooth. Dr. Truman referred to one of his patients who during his (Dr. Truman's) absence from town suffered from an abscess, and was treated by his family physician. The patient died, and Dr. Truman alluded to a fact which is invariably the case: the dentist receives the blame at such times. I could recite cases without number in which the retention of one tooth which has been abscessed has caused the death of the pulps of perfectly sound adjoining teeth, which have been the unsuspected cause of discharge through fistulas on the gum, and sometimes on the cheek, or farther down on the neck, and cases in which the usefulness of sound teeth has been destroyed or impaired by the death and absorption of the septum of bone between them, thereby weakening their support; but it is unnecessary for me to occupy your time by giving in detail a great number of cases, for enough has been shown to point out the grave danger to some patients in retaining a tooth in the mouth after it has become a source of infection.

It here becomes an interesting point to consider when a tooth does become a foreign body. My experience leads me to define it "when the point of a root has become necrosed and has lost its adhesion to the peridental membrane." This will be indicated by the continuance of a discharge either through the canal alongside the root or through a fistula upon the gum, and for such a condition extraction is strongly indicated; also for a tooth with a blind abscess, which apparently yields to treatment, and yet periodically grows sore and needs to be re-treated, which is no doubt but a modified expression of the preceding condition. It is a question of but little time when such a tooth will assume a formidable exhibition of danger, which it is much better for the patient and for the reputation of the dentist to avoid by advising early extraction.

I have endeavored to present to you a view of the practice of dentistry in these particular cases, as it is presented to one who devotes his practice entirely to extracting; and in doing so, it is not in the spirit of questioning the ability of any dentist, for some of these cases have occurred in the hands of the most skillful in the profession, but the *system of practice* must be radically wrong when the authorized proceedings in the treatment of diseases—as shown in the cases I have just cited—will come so near to placing life in jeopardy, besides entailing upon a patient untold suffering and injury. If we could give any assurance that an alveolar abscess once cured would never again become troublesome, or if we could differentiate with certainty

those which are benign in character from those which may become the sources of infectious inflammation, such a system might be acceptable; but unfortunately there is frequent recurrence of inflammation about many of the teeth which have had this history, and each succeeding time it becomes worse than the last by enlarging the necrotic area, until we run the risk of its terminating in a manner similar to some of those I have mentioned.

Although it is my specialty to extract teeth, I have yet to advise the loss of a tooth which could be saved if the patient would embrace the opportunity. Coming in contact, as I do, with a great many people who have never thought of having their teeth attended to by a dentist,—many of them, too, people of wealth and education,—it has been my privilege and pleasure to instill into their minds the necessity for such service, and I have been the recipient of letters of thanks and flattering expressions of gratitude from them for having given them their first intimation of what a dentist could do. These have far outweighed in value the small fee which might have been collected by advising otherwise. We all have the success of our calling as a profession near to heart, but success cannot be complete unless it meets with popular support. It has grieved me more than I can tell to stand by and listen to the unkind expressions of those who have unfortunately met with the experience of some of these cases, and when they are accompanied by members of the medical profession, to listen to *their* uncomplimentary criticism of a system of practice which will permit such a state of affairs to exist, and it has made me feel the necessity of calling your attention to some of the conditions which, from the standpoint of a specialist, seem to mark the limits of preservation of certain teeth and the graver consequences which may result from their prolonged retention, when their removal is demanded by the existence of unmistakable indications of danger, and of urging the adoption of a more truly conservative practice, not placing upon one dead and diseased tooth a value far outweighing the possible injury it may do.

ACETANILID: ITS USE IN DENTISTRY.

BY JOHN SCOTT SANGER, M.D., D.D.S., EAST ORANGE, N. J.

(Read before the Second District Dental Society of the State of New York, January 9, 1893.)

ACETANILID was introduced to chemists by Gerhardt, in 1845, but was not adopted by the medical profession until introduced by Messrs. Cahn and Heppe, of Berlin, in 1886.

It is a white crystalline powder, producing a slight burning sensation when applied to the tongue, but without disagreeable taste. It is made by adding an excess of glacial acetic acid to pure, colorless anilin. When evaporated at a high temperature, it appears in large scales, like "mother-of-pearl." It should be white or slightly rose-tinted, and form a colorless liquid when heated upon platinum foil, and should completely volatilize. It is only slightly soluble in cold water, but in water of 105° F. it will dissolve in the proportion of one part to fifty; in alcohol, from three to five parts; and in ether or chloroform, in a little larger proportion.

The dose varies from two and one-half grains, repeated every hour, to ten grains every three or four hours, given in the form of a powder or tablet triturate. Acetanilid will generally relieve any tendency to nausea or vomiting, and is well borne by a weak stomach. The prolonged administration of this drug habituates the system to it, and it loses its effect. By withholding it from twenty-four to forty-eight hours, its action is renewed.

The experimental physiological effects upon the system determine that when administered it is rapidly taken up by the blood, whose oxyhemoglobin is partly changed into methyhemoglobin. The effect of this change in its composition modifies the so-called function of the ozoning process, and in that manner impairs the constructive metamorphosis and interferes with the production of heat. This is manifested by a condition of general cyanosis. At the same time it raises the intervacular blood-pressure by contracting the peripheral arterioles, the result of this being to slow the heart's action and to increase the tension of the pulse.

The medical properties of this drug, based upon experimental and physiological results, are those of a diuretic, antiperiodic, cardiac sedative, antipyretic and antineuralgic. The last two directions in which this drug acts are, first, that of reducing the temperature of patients during fevers, and the second, to diminish the functional activity of the motor and sensory nerves, at the same time inhibiting the reflex action, and in relieving the inflammatory condition of the nerves in any of the neurotic diseases, as tabes dorsalis, pulpitis, etc. In this last-mentioned direction this drug is of especial value to the dentist, as its action is immediate, and the depressing effects which follow the administration of other drugs for this purpose do not follow in the use of acetanilid.

During several years of medical practice it has proved invaluable, and in my dental practice I find it of great service in filling a gap where all other remedies fail. For example, a patient had been suffering from a very severe attack of neuralgia for at least two days. Upon examination I found that the first and second molars, and the second bicuspid of the lower jaw of the left side, had been crowned with gold for three or four years. The second bicuspid was quite sore to pressure, so I painted the gum with tinct. aconit. rad. and iodin, equal parts, and applied a capsicum plaster. I then prescribed two and one-half grains of acetanilid. On her return the following day, she stated that she obtained relief about ten minutes after taking the powder, and had no return of the trouble until the next morning, when, picking her teeth with a pin, she pushed it under the crown of the second molar, thereby causing great pain. I removed the crown, and found an exposed pulp with a drop of pus upon it. I then proceeded with the usual treatment. In this case the antineuralgic action began within ten minutes, but it varies in other cases from five to thirty minutes and lasts about eight hours.

My second illustration treats of one of those frequent cases where a dentist attempts to destroy the pulp with arsenic and creasote, or arsenious acid, and during that time his patient suffers long and severely. These were the circumstances governing the condition of a patient who suffered from a filled tooth. On removing the filling, I found a pulp which had been capped, and decided to destroy it ;

but my patient objected, explaining that she had had a pulp destroyed previously and suffered intense pain. I persuaded her, however, to let me try. I inserted some arsenic and creasote, and prescribed two and one-half grains of acetanilid, to be taken if in pain, and to repeat hourly until pain was relieved. In two days the pulp was destroyed. My patient did not suffer any during the treatment, and took but ten grains of acetanilid. The use of this drug in similar cases has never failed me.

The next case belongs to a rare class, and illustrates the anti-periodic property of this drug. A patient sent for me about five P.M., and stated that she was suffering from an attack of neuralgia. These attacks began about four o'clock P.M., and lasted until five A.M. She had not slept for three nights, except by the aid of morphin. I examined her teeth, and found nothing to cause this condition. The pain began in the shoulder-joint and extended up the neck to a point corresponding to the angle of the inferior maxillary bone, beginning again in the temporo-maxillary articulation and extending over the face and to all the teeth of the right side. The periodic return suggested the diagnosis of neuralgia, due to malarial poisoning. The patient being within two weeks of her full term of pregnancy, I considered it unsafe to administer large doses of quinin, but prescribed acetanilid, ten grains to be taken morning and evening. Immediate and permanent relief was experienced.

My last case is one in which my patient had a tooth extracted about six months previously. The gum had thoroughly healed, and she had experienced no trouble until a few days before she called at the office. Upon examination, I found that an abscess had formed. This I lanced and syringed with a solution of carbolic acid, and prescribed two and one-half grains of acetanilid, to be repeated hourly until pain was relieved. She was permanently relieved in three days.

Owing to its diuretic action, this drug is especially safe in cases of "kidney-trouble." In case of poisoning by acetanilid, you will find your patient with a profuse perspiration, an intermittent pulse, cyanosis, and in a state of collapse. You will administer ether, or, what is better, atropia hypodermically, in conjunction with a cardiac stimulant. The patient should be wrapped in warm blankets. Poisoning would be due to an overdose, but there is no danger if you closely follow the directions approved by the medical profession in the use of this drug.

A REGULATING CASE FROM PRACTICE.

BY NORMAN S. ESSIG, D.D.S., PHILADELPHIA, PA.

THE cuspid is generally conceded to be the most difficult tooth in the mouth to move, on account of the great length and firm imbedment of its root.

Among the numerous methods devised for the correction of irregularities of the teeth,—rubber ligatures, elastic bands, springs, etc.,—all are more or less objectionable for this class of cases, on account of the inflammation and excessive soreness which accompany their use.

There is often great difficulty in retaining the tooth in its new posi-

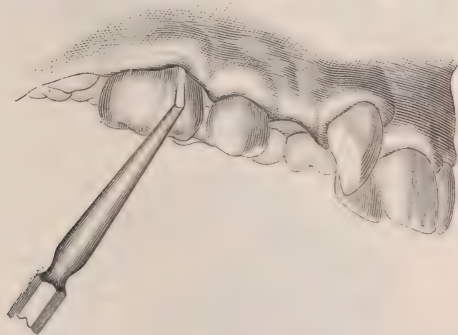
tion, and one of the advantages of the class of appliances herein described is that, after they have served their purpose in the correction of the irregularity, they do perfectly well as retaining fixtures.

This method possesses advantages over those already named, in that the fixtures cover the tooth or teeth entirely, so that they can be kept perfectly clean, and the appliance can be worn as a retaining fixture for any length of time.

After the impression has been taken and the model well dried, it should be carefully studied, so as to determine which tooth or teeth would make the best point of resistance from which the force is to be exerted. This being decided upon, the tooth to be moved is next considered, and the point noted where the most force can be brought to bear in the desired direction. When this has been determined, the model is ready to be trimmed.

The case which I have selected to illustrate the efficiency of the screw in moving irregular teeth is a cuspid that was not only greatly out of its normal place in the arch, but much turned upon its axis.

FIG. 1.



Here it was necessary to draw it back so that it might be made to assume its place between the lateral and second bicuspid, and at the same time to turn upon its axis. This was accomplished by hooking the bar into a staple soldered well around on that part of the cap covering the labial surface of the tooth.

An excavator was passed around the molar at that position on the model representing the free margin of the gum, cutting away the plaster from around the neck of the tooth, exposing what would correspond to that portion of the tooth or root just above the enamel, as in Fig. 1.

No. 30 gold, about 22 carat, is used and burnished down, forming a cap which fits the tooth perfectly, following the line where the excavator has cut away the plaster.

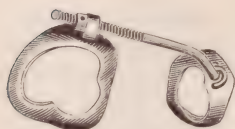
If such a band is to be placed upon an incisor or lateral, the face of the cap may be cut out, thus avoiding too much of a display of gold. Thin platinum may also be used, about the thickness of writing-paper, and pure gold flowed over the surface after the piece is invested, but it is rather difficult to get the gold evenly distributed over the platinum.

The first molar, on account of its being provided with three roots,

is usually the best tooth to select for the point of resistance, for being reinforced by the bicuspid, it makes it pretty certain that it will not move when the screw is in operation.

The gold is brought just over the edges of the cusps, and burished to conform to the contour of the crown; the bar is then put in position, as shown in Fig. 2, and the loop or rings, by which it is attached to the caps, cemented on with hard wax. It is then invested in sand or marble-dust and plaster, and the rings soldered on.

FIG. 2.



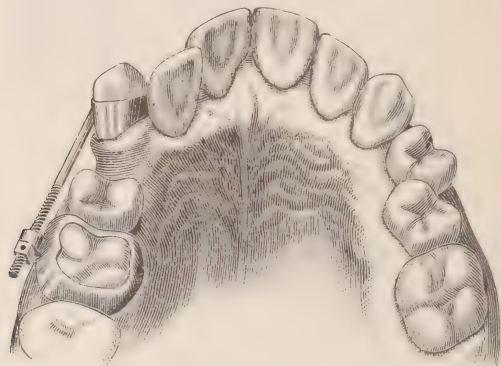
the gap and tooth, thus preventing moisture from creeping in under the gold.

Platinized gold should be used for the bar, as the thread is not so likely to strip, and it can be made of thinner wire.

When the piece is finished, we have a fixture which will exert a force in a given direction sufficiently strong to move any tooth in the mouth; and while the force is not a persistent one, it is positive and certain, and unaccompanied by any inflammation or soreness.

Some members of the profession, who saw this piece before it was put in the mouth, expressed the opinion that the molar to which the fixture was fastened as a point of resistance, and also the bicuspid,

FIG. 3.



would move before the cuspid did. The result showed, however, that this was not the case. The cuspid was not only drawn back, but turned on its axis. The position of the tooth before correction is shown in Fig. 3, and it was brought back into perfect line with the incisors. The molar and bicuspid did not change place in the slightest degree. The case as finally corrected is shown in Fig. 4.

The screw will probably supersede all the older methods in these cases by reason of its positive force, for by its use the danger of death of the tooth, caused by the continued force of rubber ligatures and steel springs, is avoided.

The screw and nut may be used in the treatment of any form of irregularity.

It is desirable to see the patient about every other day, but if this cannot be done, as often as possible, and with a small wrench, made for the purpose, the tooth should be turned as much as can be borne by the patient. This slight pain, caused by the tightening of the screw, quickly ceases, and really forms the only discomfort experienced during the operation. The patient soon becomes accustomed

FIG. 4.



to the piece, the bar being the only noticeable feature, as the caps are made of such thin gold that little difference is felt between them and the natural tooth.

The small screw-plate and taps used in the construction of the fixture may be obtained at almost any depot or jewelers' supply store, and these, together with ordinary laboratory tools, form all that is necessary for making the piece described.

A SYSTEM OF CROWN- AND BRIDGE-WORK.

BY DRS. N. T. SHIELDS AND L. N. SHIELDS, NEW YORK, N. Y., AND GALVESTON, TEXAS.

(Concluded from page 207.)

In our previous paper we dealt with the details of the construction of individual crowns: in the first instance, of the solid, all-gold crown, and afterward of the combination of the porcelain facings with the gold crown as adapted to incisors, cuspids, bicuspid, and molars respectively. Having described the crowns which form the separate elements, we will now describe the method of assembling these in the construction of bridges. This can best be done by a study of typical individual cases, which will serve for illustration. Perhaps the simplest expression of the bridge is the one constructed of solid gold. Where the bite is close, there is nothing that acts so well for strength and cleanliness as a bridge of this character.

We will take, for illustration, the lower jaw, as we seldom make them for the upper. Having prepared the individual solid-gold crowns as previously described, place them in position on the roots and take an impression of the whole jaw. Place the crowns in their matrices in

the impression, and stay them to place with wax. Pour the model with plaster and marble-dust. You now have the crowns firmly held in position. Take also an impression of the upper jaw, place the models together, and you will have an exact articulation. Next make the grinding-surface stamps for the teeth to serve as dummies, and fill in these with twenty-two-carat solder. From a piece of No. 60 tin foil cut a pattern for a pure gold floor. Place this gold far enough away from the gum to allow for convenient cleansing. This gold floor should exactly fit the space between the abutments of the bridge. Also have enough thickness between this floor and the superior teeth for strength. Stay the floor with hard wax to the crowns to be used as abutments, flowing the wax above and below the floor at its attachments to them. Now place the grinding-surface stamps in position, getting the proper articulation by raising them and filling in with wax. Wax up accurately to form, and place a strip of pure gold along either the buccal or the lingual surface. Do not fail to have the stamps cut with projecting edges on the buccal and lingual surfaces for the purpose of staying them in the plaster investment, which will prevent their falling. Also leave the edge of the floor somewhat exposed, *so that it will not rise when soldered*. The gold strip which was placed on either the lingual or buccal surface, as the case may be, answers a valuable purpose if nicely adjusted, not only to make the gold flow into all parts, but to hold the floor and stamps exactly in position.

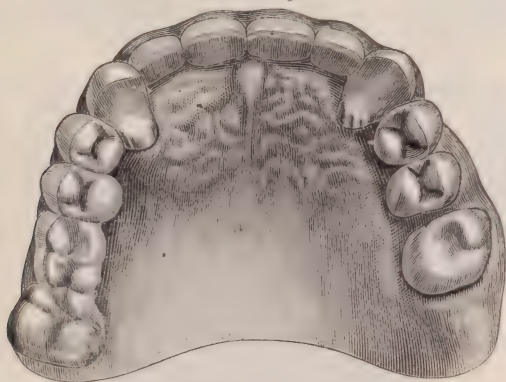
The adjustment of this strip depends upon the side chosen for soldering. It is to be applied to the buccal side if the soldering is done lingually, or *vice versa*. Now cut the plaster away, except that which holds the bridge. Make a ring, and invest in plaster and marble-dust. Roughen the plaster model and soak it in water before investing any further, to secure a firm attachment of the investment added to the model. Next wash out the wax with boiling water and dry thoroughly. As the crowns are soldered with twenty-carat solder, the entire space between the crown stamps and floor must be soldered with eighteen carat. The solder flows into the position occupied by the wax which was placed above and below the pure gold floor in staying it to the abutments, and it will finish like the inside of a watch-case. The bridge here described will give permanent service and be altogether comfortable. We use this method where the bite is close and where porcelain facings would be neither necessary nor expedient.

The following case is one in which were inserted twenty-four crowns, twelve on each jaw. The twelve superior teeth are fastened on four good roots, and include eight dummies. The inferior twelve are also fastened on four good roots, and also include eight dummies. In this case, as in all other bridge-teeth, the dummies are constructed in the manner described in our previous article (see page 207, DENTAL COSMOS for March). As will be seen in the cut, Fig. 19, the upper bridge of twelve teeth is supported upon the right second molar, right cuspid, left cuspid, and left second bicuspid. Having made all the individual crowns, they are assembled and united as follows: Adjust the second molar upon the root; this is to serve for the abutment. Now adjust the right first molar in its proper position and stay it to the second molar with hard wax, taking care that the porcelain does not touch the second molar. We also allow room for a tooth-pick to pass easily between molar and gum.

We now carefully remove the two crowns, and make an investing ring as before, just a little larger than the teeth. For this purpose we generally use the tinned iron top of a bow-spring rubber box, fastening the ends mechanically. Invest the two crowns in plaster and marble-dust, as all investments should be made for soldering. Remove the wax and fill in the space where the wax came from with additional plaster, leaving a considerable surface of gold exposed at the junction of the teeth to be soldered, so that they can be soldered more easily. They are now to be soldered together.

We next add the two bicuspid to the molar in the same manner, the teeth having first been polished and fitted in the mouth. There must be just enough space under the first bicuspid to easily keep it clean, yet so slight that when the piece is wet the space cannot be seen. The four teeth soldered together, and the cuspid, are now placed in position, and an impression of the grinding-surfaces, together with the cuspid, is gently and carefully taken. As soon as the impression

FIG. 19.



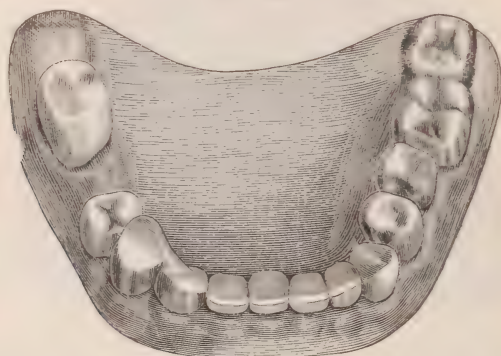
is removed place it in water, then remove the five crowns, place them exactly in their matrices in the impression, and wax them to the modeling compound with which the impression is taken. Fill with plaster and marble-dust the impression, containing the teeth in position, and when set remove the impression material. Now complete the investment by placing the model in a ring made to fit as before by pouring additional plaster and marble-dust, so as to include the grinding- and cutting-surfaces. The position of the four front teeth, stayed together with hard wax, is obtained as before, and these are soldered together.

In soldering incisor teeth, the facings being thin, as is also the contoured palatal surface, borax is liable to run between them and cause them to crack. To prevent this, we take a narrow strip of pure gold and lay over the approximal surfaces, sticking the gold into the plaster at the cutting-edges and cervical ends. If borax is now used with care, there will be no trouble. If the teeth have been made carefully and the pure gold still extends along the approximal surfaces unbroken, it can be easily soldered with twenty-carat solder; but if in the process of finishing the pure gold has been cut through, it is safer to solder them with eighteen-carat solder.

The next step is to place the first section of the bridge, consisting of five crowns, in position, and get the relative position of the section containing the four front teeth, making the wax stay, in this case, quite heavy and strong. Now remove the whole together, invest and solder as before. We now place the left cuspid and second bicuspid in position, take an impression, remove, place in their matrices as previously described, pour the model of plaster and marble-dust, remove the impression material, and place the left first bicuspid dummy in position and solder. Now place these three and the other section of nine in position, and gently take an impression of the cutting-edges and grinding-surfaces. Remove and assemble the pieces in the impression, and stay to the modeling compound. Pour the model in plaster and marble-dust, remove impression material, complete the investment with the same investing material in a specially fitted ring, boil out the wax and dry thoroughly for the final soldering, which is done generally with eighteen-carat solder.

It will be seen that the attachment of each additional one or more crowns has necessitated a separate investment and soldering opera-

FIG. 20.



tion. As the piece becomes larger the bulk of investing material is necessarily increased, and while the Knapp blow-pipe affords ample heat of the highest intensity for soldering the smaller pieces, the quantity of heat required for soldering the larger pieces cannot be so well obtained by the use of this instrument. We find it necessary, therefore, to employ the larger heat volume of the foot blow-pipe, which while producing a degree of heat which is less intense, furnishes a greater quantity of heat and is applicable to the whole surface, and it thus enables the operator to raise a large block of investment to the soldering point much more easily. It is worth while to note, also, that in completing the investment a large surface of gold should be left exposed, so that the piece may be readily heated by contact with the flame. Generally speaking, this should include the whole palatal surface of the two teeth to be joined. We next grind down and polish the whole bridge, but on the labial and buccal surfaces it is necessary to simply use brush wheels, these surfaces having been finished smoothly before they were assembled and united to each other.

The bridge is now ready to be cemented to place in the mouth, which is done in the usual way by roughening the root-canals with a

wheel bur, filling with cement, and pressing the fixture firmly to place. For mounting our bridge-work, we use dento-plastique.

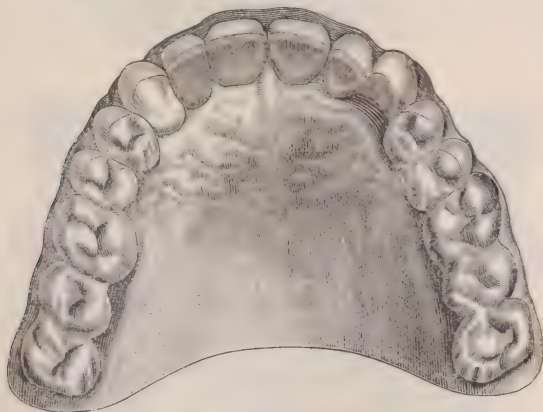
The supports for the lower bridge in this case (see Fig. 20) are the left first molar, left second bicuspid, left first bicuspid, and right first bicuspid. The second molar is actually made a part of the first molar, by first getting the position of the grinding-surface, then box-

FIG. 21.



ing it in all round except on the lingual side, and soldering through the lingual surface, making it all solid gold. These molars and the second bicuspid are placed in position, an impression taken, and the separate pieces soldered together; next these three and the left first bicuspid are tried in for position, an impression taken, and the soldering done as before. The six front teeth are then soldered after get-

FIG. 22.

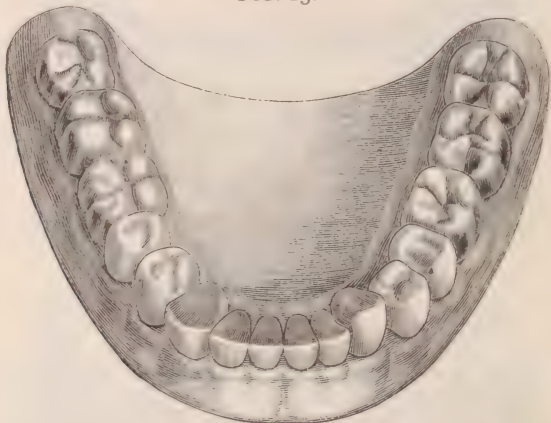


ting position, they are then waxed hard and fast to the bicuspid and molars, and with great care removed without disturbing their proper relation. If at any time it should be impossible to remove, the correct position can be obtained by using the correct articulation with which the crowns were made, because when the crowns are soldered together, it must be done with such great care that the fixture will go

back with the crowns in their respective places on the plaster model that was made when the impression of the four foundations was taken. Just before we take this impression we place a continuous piece of beeswax over all four foundations, and get a correct impression of the upper teeth in the wax.

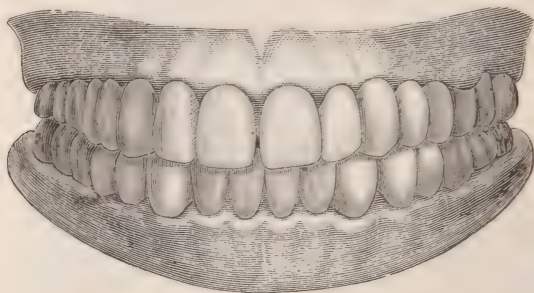
After taking the impression of the foundations, and removing them and waxing up the pivots, etc., for removal, as before directed on page

FIG. 23.



202, DENTAL COSMOS, March, pour the plaster. But just before the foundations are removed place the wax bite, which has been carefully removed from the mouth, after hardening with water, upon your foundations, stay it well in position with wax, and put it in the articulator (we use the Bonwill articulator), and you will have a perfect articulation ; therefore, if you find the six teeth unavoidably move

FIG. 24.

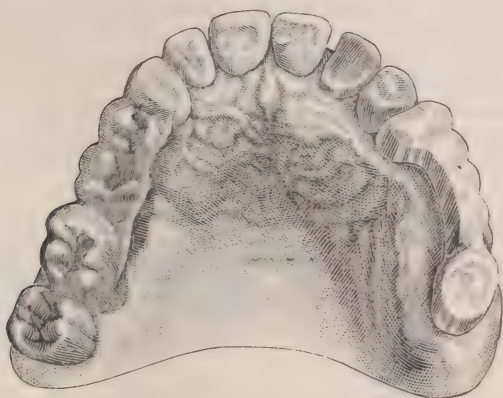


from position, it may be corrected from the bite in the articulator, but we prefer the mouth. Now solder. Next solder the inferior right first and second bicuspid, and lastly place all in position and gently take an impression of the grinding- and cutting-surfaces, and solder the right first bicuspid and cuspid. Fig. 21 shows the occlusion.

Figs. 22-24 show one of the most extensive cases on record, being constructed of thirty-two crowns, one dummy tooth, inferior jaw, one

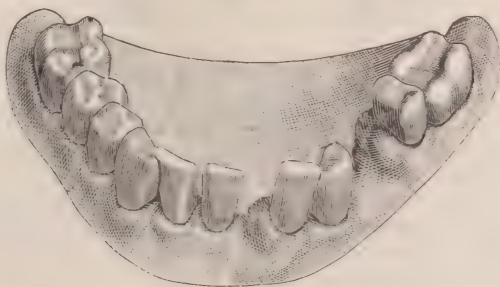
made of solid gold, the inferior right first molar, and three dummy teeth in the upper jaw. Fig. 25 is an illustration of a case where the

FIG. 25.



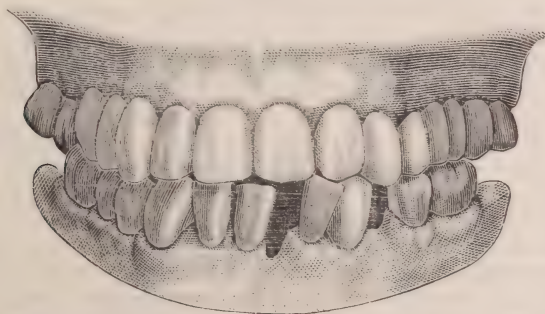
superior right second molar and superior right wisdom-tooth and inferior right first molar were being lost from want of articulation. Fig.

FIG. 26.



26 is a model of the lower jaw, showing the irregularity of the lower teeth, and Fig. 27 the case in occlusion. In the treatment of this case

FIG. 27.



we destroyed the pulps and made solid crowns for the superior molars; we also crowned the superior right cuspid, and the bridge as

constructed is a piece of mechanism which gives the patient a magnificent grinding-apparatus, and which proves most positively that bridge-work is indispensable. The peculiar articulation is well shown in the illustration. The little bridge on the left we made many years ago, simply for ornament, as the superior left wisdom-tooth is not strong, and could not be utilized for heavy strain. The superior left lateral is also crowned.

The methods which we have here described for the production of artificial crowns and their application to the construction of bridge-work of a high grade of excellence are published for the benefit of our colleagues, with the hope that they will call out a comparison of individual methods, and so serve to stimulate among us the ambition to achieve the highest results in this branch of dentistry, and establish its right to at least an equal place in the list of departments whose understanding and practice warrant our claim to be doctors of dental surgery.

MY METHOD OF SAVING OLD MOLARS WHEN THEY ARE TOO FAR GONE FOR THE ORDINARY CROWN.

BY CHAS. K. VAN VLECK, D.D.S., HUDSON, N. Y.

WE are often called upon to save a grinder when it is not only badly decayed, but one root is partially exposed, and a decayed spot on that. We cannot fill it and make a nice piece of work of it, neither can we take a gold crown and slip it on in such a way as to get a perfect fit about and under the exposed portion of said root; yet we must save it, for it is a tooth our patient cannot afford to lose.

Meeting a difficulty of this kind one day, I solved it in the following manner. The tooth in question was a second superior molar, with the palatal root exposed for more than half its length. I could run my probe in under the crown far enough to touch the labial root. This tooth was so badly decayed that filling was out of the question, and yet quite firm in the socket. Now, who could make a crown that would not leave an overhanging edge after it was brought to its place? A perfect fit and union at the gum-margin could not be accomplished with a crown made first and set afterward, so we built the crown on the tooth, and after it was completed it was a success.

In the first place, the tooth was shaped and prepared in the usual manner for setting any other collar crown. Then a piece of platinum, 28 or 30 standard gauge, was used to make a band, and on this depends the success of the operation. This band should be made to fit perfectly the gingival border, and be soldered with pure gold, and when soldering enough gold allowed to run around the inside of the band to make a very thin lining. This can be done by subjecting the whole piece to a very intense heat. The gold serves the purpose of making a better union with the amalgam we are to use later. The band is now put back on the tooth to make sure that it touches all around the gum-margin. At the gum-margin the platinum should be dressed very thin and polished. We then mix the amalgam, putting all the mercury in the mortar that we intend to use, and mixing the amalgam very thin,—about like a thick paste. Then with

a spatula we spread this thin amalgam around the inside of the band at the edge nearest the gum.

The amalgam left in the mortar is now thickened by the addition of alloy to quite a dry condition. The tooth is now dried, the band placed in position, and the edge burnished well up around the roots. Here we can bring the platinum well up under the irregular parts of the root, and the thin amalgam will make a perfect joint. After this is done, we can fill up the band with the dryer amalgam, which will take up the excess of mercury from the thinner, and uniting with the gold on the inside of the band, we have a solid mass that only needs



trimming and polishing to make it the most enduring crown that I know of. It will save some of the old landmarks that we have looked at most of our professional life.

I have used this crown for about one year, and have yet to learn of a failure. The getting of the articulation is little or no trouble, and after a little practice the operation can be performed in less than half the time that any other crown can be made.

The illustrations show some practical adaptations of the method as described.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, February 14, 1893, at the New York Academy of Medicine; the president, Dr. William Carr, in the chair.

Dr. C. F. W. Bödecker's report, as chairman of the clinic committee, was read by the secretary.

CLINIC REPORT.

The attendance was only eighteen at this afternoon's clinic, and no operations were performed. . . . Dr. G. A. Fournier presented a patient with an obturator made altogether of hard rubber. The apparatus had been worn about fifteen months with good results. . . . Dr. T. O. Oliver exhibited a coloring-matter for plas-

ter of Paris, to be used in taking impressions of the mouth. He also exhibited a preparation of balsams to be used for starting gold fillings without deep retaining-pits. . . . Dr. Charles E. Rhone, of Bellefonte, Pa., exhibited his new engine, which has several good improvements, and is on exhibition this evening.

INCIDENTS OF OFFICE PRACTICE.

Dr. R. B. Adair, of Gainesville, Ga., described and presented models of a case for which he had made an artificial denture. It was for a gentleman fifty-two years of age, who had lost all of his posterior teeth thirty years ago, and has remaining in the upper jaw only the right cuspid, lateral, and central. A number of efforts had been made to supply the lost teeth with artificial substitutes, but without success. The habit which the gentleman had of masticating on the front teeth had caused the under teeth to occlude on the outside, and they were all badly abraded. So much absorption of the ridge had taken place that in the act of mastication the buccinator muscles would force down the plates that he had worn. Dr. Adair, after obtaining an impression, and casting a die of Melotte metal, had gold crowns constructed for the lower teeth so as to raise the bite and have the occlusion come directly on the cutting-edges. He then made a gold suction-plate, trimming the model so as to insure a close adaptation, and the result was highly successful.

Dr. B. F. Luckey. About a year and a half ago I extracted a lower first bicuspid on the left side for a gentleman about fifty years of age, of somewhat dissipated habits. He was a man in a good position in life, but had been addicted to high living and strong drink for many years. His system was not in a good condition. In taking out the bicuspid, the crown broke. As the man was very nervous at the time, we went no further with the operation. About six months after I took the root out with an elevator, with more or less force. From then until the present time he has complained of a severe pain through this region of his jaw, particularly over the site of that bicuspid. Everything is healed; there is no inflammation, and it looks perfectly healthy and sound.

About a year ago, a cancer developed below his tongue. He was operated on last spring, and I think yesterday or to-day he underwent another operation. The other day, while in my office, he complained of this severe pain still troubling him, opposite the mental foramen. Did the extraction of that tooth, which was a devitalized tooth at the time it was taken out, have anything to do with the pain? Had the part become degenerated, or was there something in the operation which caused a small spicula of bone to impinge upon the inferior dental nerve, or has it been drawn or twisted in some way to bring about this severe pain, or is there no connection between the operation and the pain? I ask these questions for enlightenment.

Dr. Hart. What was the object of the extraction of the tooth?

Dr. Luckey. To relieve the man from the severe pain he was suffering at the time.

Dr. Hart. Do you connect the pain he was suffering with then with the pain he has suffered since?

Dr. Luckey. That is what I do not know. The cancer was on

the same side of the mouth. I suggested to the gentleman, when he underwent the second operation for the removal of the cancer, that he ask his physician to speak to the surgeon as to the advisability of opening down to the mental foramen, and either stretching or clipping a portion of the inferior dental nerve. It appeared to be the only feasible thing to do.

The President. I have the pleasure of introducing Dr. J. D. Thomas, of Philadelphia, who will read a paper upon "Extraction of Teeth, and Conditions warranting such Procedure."*

Discussion.

Dr. B. C. Nash. I received a note from a patient of mine on Friday, in which she said that her mother had a swollen lower jaw, and that she would like me to call and see the case, inasmuch as the lady was an invalid. I took the first opportunity on Saturday to call, and found that the lower jaw was somewhat swollen, although not very much. The patient told me it was less swollen than it had been. Looking in the mouth, I found that there was a lower molar that had been very nicely filled for some years, and on examining it I determined that the tooth had been split by impaction of the tooth above. I could see no advantage in attempting to do anything with it, and advised its removal, but the lady had been in the hands of her physician, and he had told her to let the thing run along, and it would be all right. She was not willing to have the tooth extracted then. I told her that if she would see her physician and get his consent. I would call the next day and remove the tooth. I called on Sunday afternoon, and she seemed quite pleased with the fact that there had been a discharge from the outside. She said she was not afraid that it would have any ill effect on her personal appearance, but I expressed regret that the tooth had not been extracted two days before. I extracted it without any difficulty, and with but little pain. I have not seen the case since, but presume it will be all right.

Dr. Edward C. Kirk. There is a thought that comes to me from Dr. Thomas's paper, that I shall try to bring out. I hope that some of the gentlemen present who are more familiar with the bacteriological phase of the subject will take it up and give us some light on it.

Dr. Thomas spoke of a case which I reported at the Odontological Society of Pennsylvania. The first source from which I obtained any light as to the cause of the particular inflammation in this case was through reading Dr. Miller's work on the "Micro-Organisms of the Human Mouth." His statements are reinforced by the results of careful investigation. He has said that the dead, effete, and decomposing matter which is found in the mouth forms the pabulum for the growth of certain kinds of micro-organisms. These he has divided into two classes,—those which are pathogenic, and those which are non-pathogenic. He regards the mouth as a breeding-place for such organisms, and there seems to me to be a distinct relation between these facts and the case Dr. Thomas has mentioned. It has been reported in the *International Journal*, but I should like to go over it again.

* For Dr. Thomas's paper, see page 273 of this issue.

I was called in to see a gentleman who was suffering with a severe nervous disease, to relieve him from trouble with a sixth-year molar. I opened the cavity as well as I could under the circumstances, and made an application of some antiseptic; and after one or two subsequent treatments I closed it with gutta-percha. It was some months before he could come to my office. In the mean time, I had quite forgotten the condition of the tooth. When he grew well enough to call upon me everything seemed to be sound, and through either hurry or carelessness I overlooked the exact condition of the tooth; inasmuch as it was comfortable, my attention was not particularly called to it. On the fourth of July of that year he went to the seashore, and came back a few days later, saying he had taken cold in his tooth, and had the preliminary symptoms of an alveolar abscess forming. As the man was not strong enough to go through the depression which would result from the pain and distress of an alveolar abscess, I advised him to go to Dr. Thomas and have the tooth removed. The inflammation had reached a considerable degree of intensity, but in such cases I have nearly always seen it subside after the removal of the cause of inflammation. It was not so, however, in this case. The inflammation expressed itself in a very peculiar way. Instead of the usual large swelling and the physical indications of ordinary abscess, the tissue became infiltrated with fluid. If pressed by the thumb it had a peculiar boggy feeling. There was finally a localization of pus or some other fluid. I passed a lancet into the tissue from the outside, contrary to the usual dental practice, because I found that the distance between this point where the abscess was forming was less toward the outside than the inside. The patient was so prostrated that it was really a question of his life, and it seemed dangerous to delay the evacuation in the hope of producing an opening in the mouth. When opened, an albuminoid, serous discharge followed, extremely slight, however. There was no bloody pus whatever. I washed out the tissue with phenol-sodique solutions, and irrigated it thoroughly. Some days later another abscess pointed about an inch and a half below the first, and in like manner several followed. The abscess was altogether of a different character from anything I had ever seen. My belief was the inflammation in this case was from an infection by a micro-organism of different character from those that produce ordinary yellow pus. I do not believe it was due to systemic condition alone. I think, too, that the abscessed condition would have gone on exactly the same if the tooth had been in position. I have given simply an outline of this, hoping some one can throw some light on the subject. Here was dead matter, in the form of a pulpless tooth, that had to be removed; and from my study of the subject and the unusual conditions observed in this case, I think I am justified in believing that it was a special or unusual form of pathogenic germ which produced the results noted.

Dr. C. E. Francis. After having heard and read so much during the past twenty or more years regarding the treatment of alveolar abscess, and the importance of saving all sorts of roots in their varied conditions, it is refreshing to hear such a paper as has been presented to-night, and I hope it is duly appreciated. Most of us have spent much time in futile efforts to save hopelessly diseased teeth, and

received perhaps meager compensation, to say nothing of risk to professional reputation and possibly the occasional loss of a patient, as a consequence of unsuccessful treatment.

Dr. M. L. Rhein. We all have been very much pleased with the manner in which the author presented this subject to us this evening ; but while admitting, to a very great extent, the correctness of some of the statements which he makes, I do not believe that it is wise on our part, as a scientific, progressive body, to advocate the remarks of the last speaker. Neither is it a good thing for us to accept the theory that all teeth that are in a pretty bad state should be relegated to the forceps, even though it is advisable, under some circumstances, when you consider the pocket-book of the patient or the ability of the operator individually, to save those teeth. It is anything but a progressive step in the science of dentistry for a society like ours to assume. Now the author undoubtedly in his experience has had presented to him the very worst types of cases to help bring out material for such a paper as this, and we can readily understand and sympathize with the views that he expresses in his paper when we consider the condition and extent of his practice. I believe he has fallen into a few very serious errors in the deductions which he makes, and it is those points that I wish to bring out.

To start with, he makes an assertion that a tooth becomes a foreign body when the point of the root has lost its attachment. There is no histologist in the profession that I have ever met who would not take issue with him on that statement, for the point of the root, to an extent of perhaps even one-sixteenth of an inch, may have lost all its attachment and yet the remaining portion of the root toward the crown may be thoroughly nourished, and in a condition that if that portion at the end of the root were removed the tooth would be anything but a foreign body. In describing those cases which are so hopeless that there is nothing left but the forceps, where alveolar abscess has produced great loss of tissue, the point I wish to make is this : that the disease has absolutely nothing to do with the tooth, if the same has been properly attended to. The tooth can remain there under these conditions, if it does not interfere with the proper surgical treatment of the disease as it then appears. Dr. Kirk said that the removal of the tooth in that case had very little to do with the after-results.

I also take issue with the author in describing all these cases as a condition of progressive necrosis. I have had a number of discussions about that question in this society. It certainly is not necrosis until there is a sequestrum formed and there is no life remaining. We understand this as a condition of caries, which so nearly approaches necrosis that in many cases it will become necrosis before it has finished its work of destruction. But the point is here : that each one of these teeth, if it has been antiseptically treated, if the pulp-canal has been properly taken care of, and there is no septic condition left in the canal, then if it be feasible the point of the root removed that he refers to, together with the tissue surrounding its periphery, it is as simple a matter to save that tooth in the majority of cases as it is to put an ordinary filling in a tooth. The systemic condition may become ever so serious, the encroachment of the disease into the maxillary structure may become ever so great ; if these conditions

have been adhered to, the tooth proper ceases to be a factor in the pathological disturbances set up.

Dr. Kirk. Dr. Rhein misinterprets my views. I meant the extraction had nothing to do with arresting the disease once set up. If we could treat the case and make the root aseptic before it came to us, we would have no abscess; but we have the abscess when the case comes to us. I believe the condition of the tooth has only this bearing upon the subject: it has already been the source of infection, and in removing the tooth you get rid of that. It is not the cause of the continued inflammation.

Dr. Rhein. If I have possibly mistaken the intent of the author of the paper, and could have possibly understood him to only advocate the extraction of teeth that have come to us in such a hopeless state that there is absolutely no other resource than the paper mentions,—that is, extraction,—then the paper of course admits of no discussion; but I did not understand the matter in that sense.

Dr. Nash. May I ask Dr. Rhein what condition, in his practice, would warrant the extraction of teeth?

Dr. Rhein. Supposing that the question refers strictly to abscessed teeth, I should say where the alveolar abscess was of such a nature that it would be physically impossible, considering either the systemic condition of the patient or the anatomical condition of the roots, to remove the necrosed tissue that had formed at the apex. The general principle I practice is this: that an alveolar abscess ought to be radically cured, and that it ought not to be temporized with. If you have an alveolar abscess that cannot be cured in the course of two or three weeks, that tooth ought to be removed; but there are very few such cases that have come under my notice, except in cases where the roots were in an irregular condition, where the bifurcation of the roots prevented their proper amputation, or they were in such a position in the mouth that they could not be reached.

Dr. Kasson C. Gibson. I thoroughly indorse the paper. Only within the past few days I have referred a patient to Dr. Hasbrouck for the extraction of a lower left second molar which was ulcerated. On the day following the extraction of the tooth, the patient, who was a physician and pathologist for one of the principal hospitals of this city, called at the office and said that on making a careful examination of the tooth he found the condition such as to reasonably account for all his suffering and the general condition of his health. He thought that possibly some of the cases of death due to pyemia which had not been traceable to any cause might have resulted from just such a badly abscessed tooth.

Dr. Edwin T. Darby. I came rather to listen than to talk upon this subject. We feel, in Philadelphia, that Dr. Thomas is a very safe man with whom to intrust our patients who need teeth extracted. His judgment is good, and he acts conscientiously.

There is one point in the paper which I would emphasize a little, and that is the disposition to save teeth that would be better out of the mouth than in it. We naturally feel that teeth are important organs, and we endeavor to save as many of them as possible; yet I believe from the bottom of my heart that we often urge our patients to retain teeth which are the cause of much discomfort, if not actual

pain, to them. I remember that some years ago the physicians of New York were waging war upon the subject of retaining devitalized teeth in the mouth, believing that they were the direct cause of many of the neuralgic pains from which their patients suffered. I did not coincide with their views then, nor do I wholly do so now. I believe that the dentist knows a great deal more about the teeth than the physician, and is better able to judge as to which teeth should be retained and which lost. At the same time, if any one of us were the patient, I think we would part with some teeth which we urge them to retain.

Dr. Thomas has alluded to a case which I had under treatment some years ago, which terminated in a very sad manner. I will give you the details of it as briefly as possible. A gentleman much run down in health and in an anemic condition applied to me with a central incisor badly broken down, and requested a crown engrafted upon the root. I found the tooth was a vital one, and applied arsenic to devitalize the pulp. After a day or two the pulp was extirpated, the root was treated for a day or two, and the crown was inserted. The next day, or the day following, he complained of slight pericementitis. I gave it the usual treatment for such disturbances, and supposed he was relieved. The following day I was asked to see him at his house. I met his physician at his bedside, and found my patient suffering from pyemia. He was then unconscious, and died the following day. Here was a case of pericementitis that ran into alveolar abscess and terminated in death within three days. Had I extracted that tooth when he first complained of pericementitis, I might have saved his life. Such cases usually terminate favorably, and we would reasonably expect similar cases to do so. His physician said that the scratch of a pin or any wound which suppurated would have produced death as quickly as did the abscess.

Dr. J. B. Littig. I indorse the paper fully, and think the point may be expressed in these words: that the physician is considered great according to his diagnosis, and that the dentist is considered so according to his discrimination. That is the point where we are liable to make our mistake.

Dr. Gibson. I would like to ask Dr. Kirk if, in the case he reported, there is not a possibility that the patient may have become infected from the use of the forceps?

Dr. Kirk. I think not, because the inflammation was in a very active state before the forceps were applied. There were no forceps to start the inflammation. I think it is therefore impossible.

Dr. Gibson. As the character of the discharge was different from that which usually follows alveolar abscess, it might possibly have been caused from infection.

Dr. Kirk. The character of it was what is generally called phlegmonous inflammation. It might be regarded as a possibility in some cases, but here it would be a stretch of the imagination, in view of the fact that the inflammation was well under way before the forceps were applied.

Dr. E. A. Bogue. Do you not think there was a penetration by the pus into the space between the different muscles before the extraction?

Dr. Kirk. No, sir; there was a lump as hard as a walnut, which

gradually increased in size. There was another one above this and one below, and one far down on the neck ; the lymphatics of the neck were enlarged. I think it was a case of infection by some pathogenic micro-organism, which originally found a lodgment at the apex of the root.

Dr. Bogue. Irrespective of penetration of the space between the muscles by any material, what do you think?

Dr. Kirk. I think it was simply by continuity through the circulation. These several centers of inflammation were established by the infection being passed on from one place to another.

Dr. Bogue. I want to express my thanks for what we have heard to-night ; but at the same time, inasmuch as I see several gentlemen present who are younger than the speaker, lest they should draw inferences which we cannot approve of, allow me to say that if a tooth is roughened at the apex, and we can extract it and cut off the roughened root, and reimplant it, it scarcely has to do with the question as brought up by the paper. That removal of the roughened apex is of course familiar to us all ; but it is not an easy operation to perform without the extraction of the tooth, nor is it often successful without extraction. The remark that Dr. Francis made, that we often try to save teeth that might better be in the drawer, I think is true. The pendulum is swinging backward. Now it has swung a good long way toward preservation, and I have often seen teeth which had no antagonists whatever, and which did nothing. They were useless ; they were pulpless, and abscessed for years. Such teeth might be extracted with advantage to the patient ; yet I should vote against extraction where reasonable grounds existed for an effort at saving. The case alluded to by Dr. Kirk interested me particularly, because several instances have happened to pass before me of just that kind. One came very near death. In those cases it seemed to me that the progress of the disease before extraction was such that there was an infiltration of cellular tissue by the pathogenic fluids which had formed, and which had to get out. It was not pus at all.

The President. What are the conditions under which you would extract a tooth?

Dr. Bogue. When the tooth has no antagonist, and is in such a condition that it is of no use, and when the pericemental membrane is largely gone and the tooth is loose and abscessed.

Dr. C. S. Stockton. I am very much pleased with the paper. I recall a remark made to me once when I happened to be in the office of our friend, Dr. Darby, of Philadelphia. He said, "Stockton, are you capping as many pulps as you used to?" I said, "No." He said, "You would prefer to have them at the end of the nerve-extractor rather than in the tooth?" I said, "Yes ; that is about it." He then said, "Well, I feel very much that way." And so I feel in regard to pulpless, useless teeth,—that they are often better out of the mouth than in it. How many times have you, Mr. President, and all of us, said when a tooth has been taken out, "If I could have seen the condition of this tooth before as I see it now, there would have been no question about its extraction." If we could only see into their surroundings before, there would be no question whatever about our removing them. I think I related here once a case something like the one mentioned to-night. It is a case in which I

have always taken a great interest, because I consider that I saved my patient's life. I extracted a lower wisdom-tooth, and the ulceration went on. The face swelled. He was a large, fleshy man, and in a little while his family became alarmed. It was about the time that Dr. Beard died here of blood-poisoning, and the family became anxious lest the gentleman should die from the same cause. They called in their family physician. His proposed treatment was exactly the opposite of mine,—warm poultices to the outside, etc.; and for a man in his condition I foresaw that in all probability the grave would close over him. I fought for his life, and for my reputation, too. He was a man of good sense, and he said, "It seems to me that this case belongs to the dentist." I brought my patient through, and he is living to-day. I have no doubt whatever that if the prescription and the treatment proposed by the family physician had been carried out, he would have been in his grave. I am glad that I succeeded in that case. I am well convinced, as the paper has said to-night, that a great many teeth should be taken out that we attempt to save. Every day of my life I become more and more convinced of that. How often do we see cases where we wonder how people get along,—how they masticate their food,—and we ask the question, "Are you not more or less inconvenienced in masticating your food?" and they answer "No." Yet we put forth all our exertions, and think it a wonderful thing to save an old root that may be only a root of bitterness all the rest of the patient's life. As Dr. Littig said, we must diagnose our cases well, and know that we are doing the best for the patient whose life and interest we have in our hands.

Dr. Carl Heitzmann. Not being a dental practitioner, I was greatly amused by the paper, as well as by the discussions that followed. The question is, How much can you do in a given case? and I am sorry to say most of you have admitted, Very little indeed. Dr. Bogue put it in a few words,—“I will extract a tooth when I think it is of no further service.” Dr. Littig said something similar. All that means that it is left to the personal judgment of the dentist where to save a tooth and where to extract it. And now comes in the judgment of the dentist and his experience, and all that is a comparatively futile thing, of very little value in a given case in comparison with those little bits of creatures called staphylococci. Of course desperate cases, in which nothing helps but the removal of the tooth, nowadays ought to be less numerous. Before the time of asepsis and antisepsis they occurred quite frequently. I remember a case in Vienna, where a tooth was extracted, pyemia occurred, and the man died,—very much like the case mentioned to-night. Of course it is well enough to say, as Dr. Hill put it, "Wait"; but will your judgment tell you how long to wait? Are you sure that there are not some germs concealed somewhere which will propagate and cause mischief? The case mentioned by Dr. Kirk is very instructive. What is it? I can answer in a merely theoretical way. You have all heard of the beautiful theory of Metschnikoff, of Russia, who imagined that the colorless blood-corpuscles eat up the bacilli. He is wrong altogether, because it is not the question whether the colorless blood-corpuscles will eat up the cocci, but it is a question which of the two will eat up the living matter. If a poor constitution gets a good dose of cocci in it, the protoplasm is lost and will perish; if, on the contrary,

a good constitution gets a small dose of the cocci, the staphylococci cannot do much harm, since they will be killed by the living matter of the individual.

Now in reference to the terrible cases which were mentioned to-night, it is highly probable that Dr. Kirk's case was caused by infection. We can say that if there is a certain amount of cocci causing suppuration, and the constitution of the patient is poor, then the staphylococci will conquer. It is simply the overpowering of the living matter of the patient, the staphylococci killing the living matter of the human being, at first locally and afterward generally. Some gentlemen have spoken to-night so much of the dangers of pulpless teeth. I have several pulpless teeth in my mouth, which never trouble me. It is true that pulpless teeth eventually cause alveolar abscess, but we cannot tell how the staphylococci get into the socket and the apex of the root. They may float in our blood and settle in a place where there is irritation or something dead present,—for instance, in a devitalized tooth or in some of the bones,—and cause a fatal disease, so-called osteomyelitis; but the danger that ensues cannot be avoided even by the greatest precaution, because sometimes the staphylococci cause mischief where the patient is in the best hands. About twelve years ago I had trouble in my lower jaw. I had first pericementitis, caused by a broken root; then suppurative periostitis and necrosis. Two roots of the first left molar were deprived of their sockets, but the third one remained imbedded, and has kept since then perfectly firm. How foolish the doctor would have been to remove that tooth! Dr. Bödecker takes off occasionally the carious portions from the barren roots, and then the tooth serves me again for a year or more. Do not be too hasty in extracting teeth, although the gentleman from Philadelphia recommends it because he makes a specialty of it. Any sensible dentist will tell you not to do it, however.

About thirty-four years ago, in Professor Wedl's laboratory, where I was studying, they brought in lots of dry teeth as they were pulled out at different institutions,—just thrown wholesale into a jar, and when that jar was full it was carried to the laboratory. The jar was emptied with a great rattle, and teeth were selected for anatomical research. I thought at that time it was a good thing to examine teeth in that way. Since I have learned, however, especially in the last fifteen years, what a wonderfully complicated structure makes up a live tooth, I have the greatest respect for one, and I detest the idea of pulling a tooth so long as a possibility exists of keeping it in the mouth. Dr. Bogue is very conservative, and he has good reason to be so. A poor man cannot afford to pay the dentist, therefore he will have his teeth extracted, and an ignorant man is in the same position. A well-educated man does not know sometimes that there is such a thing as a dentist. It is incredible that so little conservative dentistry is done even in our day. One of the gentlemen present, at a previous meeting, stated that there is too much dentistry in this country, and that is to be blamed for the loss of teeth and bad dentures. If we instruct people how to check the evil at the very start, I think we could do a great deal of good. To prevent the trouble seems to me far more important than to cure it. I have had a great many teeth extracted myself, and yet I can masticate very well. I

often feel sorry that in my youth I was so lavish with my teeth. Being a medical student, and poor, whenever I had a pain in one of my teeth I went to a dentist and had it taken out. I would not do it now. I am reminded of the saying of an old "Geheimrath"—an honorary title meaning privy councillor—in Germany: "When I was young, I had splendid teeth, but nothing to eat; now I have plenty to eat, but no teeth to chew with."

Dr. Bogue. Will you excuse me if I take advantage of something which Dr. Heitzmann said that is quite foreign to our present subject? Dr. Darby spoke of treating for a few days the tooth which he devitalized. I thought in the first instance that I understood him to say for two days.

Dr. Darby. I do not remember whether it was two or three days. I never fill a root immediately unless I extirpate a pulp alive.

Dr. Bogue. This subject was brought up in another society on January 7. This is it. Arsenic may be applied to the pulp for the purpose of devitalizing, and the separation of the dead from the living part never takes place until the seventh or eighth day, and sometimes the tenth, after the arsenic is applied. Whoever puts in arsenic to-day and attempts to take out the pulp to-morrow, makes a failure.

Dr. Darby. Not always so; not in single-rooted teeth.

Dr. Bogue. From the escharotic action of the arsenic, he certainly does not get the separation of the dead portion from the living.

A Member. Can you prove it?

Dr. Bogue. I will not undertake to prove it; it is too self-evident. On the eleventh or twelfth day after the application, you may find putrescence beginning; previous to the eighth day you will never find the eschar coming off the wound cleanly. You may, as Dr. Darby has said, extirpate or amputate a pulp in a single-rooted tooth, but you will never get the clean separation that is so desirable, if arsenic is used, without waiting for it at least eight days.

Dr. Thomas. I have been very much interested in the discussion, and considerably flattered by the complimentary things that have been said about the paper; so much so, in fact, that I almost regret having presented it, because so many of the gentlemen present seem to concur with it.

I did not think there would be such unanimity of sentiment, for, from my practice, it seems to me that the general policy of the profession is to endeavor to save everything without any regard to the local or systemic condition of the patient. When I was in college, Dr. Flagg always taught that it was not only possible, but desirable, to save everything in the shape of a tooth or root. Dr. Stellwagen teaches the same, so that every young man leaves his college imbued with the idea that it is little less than a crime to advise extraction under any circumstances; and should his patient unfortunately lose a tooth, it is regarded as a reflection upon his ability to properly treat it. The same line of teaching is followed by Dr. Black in the article I quoted from in the "American System." It is a noticeable fact that the graduate changes his opinion as he advances in his practice. It is following this system of never consenting to the loss of a tooth that has led to the disastrous results in the cases cited.

I don't want to be understood as saying that teeth should not be

treated. As Dr. Rhein suggests, many pulpless teeth are amenable to treatment, and even after becoming abscessed can be made useful. But I refer to cases which persistently refuse to respond to the treatment, or when apparently healed, and you think you have made a success of it, and in the course of three months or more trouble again ensues. These cases may depend upon the condition of the patient or from whatever cause, and the frequent recurrence of the abscess is but an indication that, sooner or later, it may result in serious trouble, and extraction should be advised.

Adjourned.

B. C. NASH, *Secretary*.

SECOND DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE Second District Dental Society held its regular monthly meeting January 9, 1893.

INCIDENTS OF OFFICE PRACTICE.

Dr. W. H. H. Barker. At our last meeting I showed a separation between the right lateral and incisor, without any apparent cause. The question involved was, What was the cause, and what would be the result of any interference? If brought back to their original position, would they be liable to remain so? In the course of the discussion, some one suggested that the occlusion had something to do with it, and it was suggested by Dr. Ottolengui that we set the model up. I have procured an impression of the lower jaw and mounted it upon the articulator kindly loaned by Dr. Ottolengui. The advantage of this is that it shows the chewing motion, so that you will readily see how it works.

Dr. O. E. Houghton. I have a model of a similar case to present, with which I think occlusion has nothing to do. The case is that of a gentleman about forty years of age. Three years ago the right central was in line with the left central, and the articulation and general regularity was then perfect. About three years ago this feature of gradual separation began to show itself, and has grown worse. I found very little pyorrhea present, but there was some. I suggested to the patient that I should cut the central off, and by crowning the root straighten it that way. Three years ago the teeth were perfectly regular.

Dr. A. W. Harlan. I have examined the models passed around, and that of Dr. Houghton is in one respect more pronounced than that of the other gentleman. I should say that the probabilities are that the separation and protrusion of the teeth have been caused partially, if not entirely, by mouth-breathing. In examining a great number of cases of so-called pyorrhea alveolaris, I have discovered that if the breathing is corrected there is some hope of curing the case by operative treatment; if the person cannot be taught to breathe through the nose, or if he suffers from atresia of the nasal passages to an extent that is incurable except by operation, and the patient won't have the operation performed, there is not much hope for a successful result from cutting off such teeth and putting crowns on them, for very soon the artificial crown will protrude as the natural crown

did. I would not state it as a positive thing that all such cases are caused by mouth-breathing, but in many cases, especially in Chicago, where catarrhal troubles prevail, on account of the proximity of the lake, we find such cases. We are perhaps frequently taxed to find out the cause of this unsightly separation of teeth, but very generally we will have to come to the conclusion that it is a defect in the act of inspiring or respiring that is the cause of this condition in its incipency.

Dr. Houghton. As I have stated, this case is about forty years of age, and three years ago the teeth were in perfect line. I will admit that there is some mouth-breathing in this case. Suppose this to be the case, why should it not have started long ago?

Dr. R. Ottolengui. I am very much interested in Dr. Harlan's theory, because I don't understand it, and I would like to ask him to explain a little more fully how mouth-breathing does this. Why should it make one tooth protrude and not another, and how does breathing through the mouth make any change in the teeth? That is a theory that seems to be held by many gentlemen in Chicago, but I don't understand it. I would like to have him tell me just how it does make these teeth protrude.

Dr. Thayer. I would like to ask Dr. Houghton if this person is in the habit of carrying a pipe in his mouth?

Dr. Houghton. I have never seen him with a pipe, although he smokes cigars occasionally.

Dr. Harlan. The question of mouth-breathing in its relation to the position of the teeth is one which can hardly be handled in a three-minutes' talk, because perhaps so little is known about it that we could hardly bring all of the points together to bear on that one theory of the separation or protrusion of the teeth. The mere fact of separating them with rubber or cotton, or any other substance that gradually expands, does not of itself figure as a cause in the permanent separation of the teeth. I had my own incisors separated with rubber bands when I was about eighteen, and of course at that age the jaws are not fully developed, or if they were developed, they would not be fully solidified. It is not alone the breathing through the mouth at night that acts in separating the teeth, and it is not good logic to assume that because the patient does breathe through his mouth this must necessarily spread all of his teeth, because the force of the expired air and that of the inspired air does not come equally through the spaces between his teeth. Mouth-breathing is not necessarily a condition related to sleep; it is brought about by insufficient lung capacity. A person does not become a habitual mouth-breather in a day, or a week, or a month, or a year. It is a gradually acquired habit; in many cases the employment of the individual, keeping his or her body in such a constrained position that the effort to breathe is so great and the insufficiency of the inspired air is such that the mouth is opened to gasp for more, and it may not be opened symmetrically. If you will look at the literature of the subject of mouth-breathing, as written by some of your own distinguished surgeons—Bosworth, and others that I happen to think of just now—in the city of New York, you will find that they have studied this in relation to its connection with nasal catarrh and disease of the respiratory passages in general. The reason why teeth separate at one point and not

between two or three or four is because, in all probability, the weakest point is found in the effort to inspire air; the expired air perhaps is not so forcible in its expulsion as that of the inspired. In addition to the mere mechanical effort of mouth-breathing, the pathologists tell us that a dry condition of the mucous membrane and a cessation of the function of the mucous glands in the region of the teeth has a tendency to cause the gum to become retracted, and when there is an initial lesion and a continual strain upon that weakened part, you must finally have a disastrous result.

I do not desire to discuss this question, as I said before, for the reason that a few minutes are utterly inadequate to make a presentation of the case. If this society should desire, at some future time, I should be very happy to present them with a paper on the subject, and in that way give in a more concise form my reasons for the belief that many of the separations have their beginning in defective respiratory function.

Dr. W. W. Walker. I would like to ask Dr. Houghton if the root of that tooth is affected with pyorrhea? I think that the cause of this condition is simply pyorrhea. Four years ago the right central in my own mouth was exactly in line and perfectly even. I noticed one day that the right central stood out a trifle, and I had it examined by an expert, who told me that the root was affected. I noticed that in closing my teeth the lower ones, in masticating my food, would strike on the central before any other tooth. He suggested that I grind off the lower tooth a little, which I did, and now when I throw my teeth out it is all right, and there is no further tendency to elongation.

Dr. Houghton. I would like to ask if Dr. Harlan cannot give us a statement as to what he would do in that case.

Dr. Harlan. Of course it is hard to tell what I would do in this particular case, but one of the things I would do would be to draw the tooth back in position and devitalize the pulp, and hold it in position with bands, probably over the four incisors, for a time. Of course there is possibly a disease of the socket of the tooth; but the so-called pyorrhea alveolaris is not the starting-point of the pushing out of these teeth. The question of the treatment of the case involves the question of the whole subject of mouth-breathing, and these teeth have the appearance of never having been exactly in apposition. It seems as though there was a slight natural separation of these teeth, that they never did touch, and that from neglect, possibly from the extraction of other teeth, which had a slight tendency to change their position; I should say in addition, without having seen the person, that he was a mouth-breather. Dr. G. V. Black, of Jacksonville, has exactly the same separation between his laterals and incisors, and he is very clear as to the cause of the separation of his teeth.

Dr. O. E. Hill. Would you try to hold them together, or try to pull them back?

Dr. Harlan. I would certainly try to bring them together and hold them in place. I have several now where there are small plates in the mouth, holding the teeth securely in their original position, and I expect in most of these cases to have to hold them for four or five years, and then let them gradually do without the plate,—wearing it one day, and then every third day, and so on.

Dr. A. L. Northrop. As a usual thing, where I see a tooth that has started to move out, I find by moving the lower jaw that the lower teeth will fit against it, and at the same time the other teeth will be in perfect position, showing that there is a wear there; and I have thought that many people, when asleep, get their teeth in that position and then push on them. The membrane becomes thickened by a sort of chronic inflammation. I relieve the contact of the teeth, so that it is impossible for the person to strike them with the lower teeth, and then for a long time—if I can control the patient—I treat that tooth, trying to reduce any inflammation that there may be. I have one case now where the tooth protruded very much, and I cut off the lower teeth last spring. I see at this time that the tooth of its own accord has gone back fully one-half, and is apparently quite healthy. I think the tooth will go back almost entirely. I always relieve the lower teeth if it is possible; and if it is not, I recommend that the patient wear a plate at night.

Meeting held February 13, 1893.

INCIDENTS OF OFFICE PRACTICE.

Dr. F. T. Van Woert. Some time ago—just how long I cannot remember—my attention was called to trichloracetic acid by a short article in one of the journals, that came from the pen of our esteemed colleague, Dr. Peirce, of Philadelphia; and later I began using the drug in connection with pyrozone, the combination of which has given me results in the treatment of pyorrhea so remarkably satisfactory that, like the old-time exalter, I feel like shouting "Glory!" There has been nothing presented to the profession during my practice that promises so much. A patient, a lady about thirty-five years of age, has been in my hands for treatment the last year and a half, and I could not see that I had made the least advance toward success. The disease was apparent throughout the whole mouth; but the lower anterior teeth were the ones that I had about decided to remove, and as a last effort to save them I began treating with the trichloracetic acid and pyrozone. At the end of ten days, during which practically only two treatments had been given, I had the satisfaction of finding the parts in a healthy condition,—not the least sign of pus, and apparently a perfect union between the soft tissues and the tooth, which seems to me almost marvelous. What the ultimate outcome will be I can only guess, as the whole thing is so entirely new. I should be very glad if any of the gentlemen present who have used these drugs, and particularly in the treatment of pyorrhea, would relate their experience; and those who have not I would advise to do so.

Dr. Edward C. Kirk. I think it was a little over a year ago that my attention was called to the use of trichloracetic acid through a note in one of the medical journals; it was there recommended for the removal of vascular growths upon the mucous membrane. I sent for an ounce sample, and made some experiments with it in the treatment of the vascular tumors of the pulp and hypertrophy of the gum-festoon so frequently seen in connection with caries of the sixth-year molar in children, in which the cavity is filled up with the growth, and the margin greatly inflamed and presenting a very unhealthy

appearance. I used for the removal of these growths a very strong solution of about ninety per cent., by an application of the solution on cotton placed around a piece of orange-wood. With this I could wipe out the growth a layer at a time, and there was no hemorrhage or pain during the removal. My next experiment with it was in cases of pyorrhea, and I am glad to add my testimony to that of Dr. Van Woert as to its exceedingly remarkable action in these cases. I have tried nearly everything that has been recommended for the treatment of pyorrhea, and I have had perhaps the average success. A lady who had been treated for a chronic condition of pyorrhea for many years fell into my hands as a patient, and her lower incisors were very loose. They were all dancing up and down in pus, and it looked as though there was no alternative but to extract them. I said, Here is a case that I can experiment with, and if I should not be able to save the teeth the patient will be no worse off than before treatment. So I proceeded to remove the deposits, using applications of trichloracetic acid for the purpose of softening the concretions upon the roots. I went vigorously to work with the idea of thoroughly removing every particle of deposit. The second visit, which occurred about a week afterward, showed that there was no discharge of pus from four of the teeth; two showed a little pus-discharge. The gum-margin of these two teeth, instead of adhering closely to the teeth with a sharp, thin margin, was thickened and inverted, looking as though the teeth were stuck in a batch of soft dough. I made the second and third treatment, using the trichloracetic acid and pyrozone, as before, in connection with the use of scalers. About the third visit, I found that the gum around three of the lower incisors had completely changed in appearance, and, instead of the inverted character which it had formerly presented, was normal in appearance, showing a fine, sharp line of attachment, and was in a perfectly healthy condition. I then examined further, and found that the other teeth which did not have this close vital attachment of the gum still had some small deposit of tartar. I persevered until I had removed absolutely everything in the shape of a calcareous deposit from the roots, and I have the six teeth now in healthy condition. The remainder of the teeth in the mouth have been without treatment, and are still typical cases of pyorrhea. But I am so much impressed with the results in this case that, as I have said to one or two of my colleagues in Philadelphia, I am almost ready to go on record for the statement that where we do not cure pyorrhea, it means that we have not removed every particle of deposit from the root. I am inclined to this because of the very closely adhering quality of the tartar, for though I thought I had completely removed it I found still more; but afterward, when I had completely removed it, complete restoration followed. I want, however, to try it further before I make so dogmatic a statement.

Dr. R. Ottolengui. I would like to ask Dr. Kirk whether he thinks a restoration of that kind could be made where the pulp had been removed, or whether he would only expect that to occur where the pulp was alive?

Dr. Kirk. I never think about pyorrhea in that sense. I simply try experiments and note results. I regard pyorrhea as one of the disorders that we have no business to speculate about. On general principles, I should think the chances against a pulpless tooth; but

that is merely a speculation, and I feel, in view of our lack of exact knowledge on the subject, that I have no right to make that kind of a guess in relation to any case of pyorrhea.

Dr. Van Woert. In the case which I recited, one of the teeth was dead, and there was no apparent difference in the action of the trichloracetic acid. It acts as an escharotic, and while there is no restoration of tissue, there is adhesion, and the parts look healthy. In the case that I speak of, I have united the teeth by bridging, and they are doing very nicely.

Dr. Ottolengui. I would say just a few more words on that question which I asked. I have a patient who had a pyorrhea pocket around a tooth in his mouth; the gum had receded. Recently he came in, complaining that he had been in agony and had had a sleepless night. His theory was that I must destroy the pulp; the whole tooth had become so sensitive that he could not put hot or cold water in his mouth without having it ache. I asked him to allow me to experiment with it, and I treated the pocket with pyrozone. He came again in the afternoon and said that he had had some relief, and I gave him a second treatment. He was in the next morning, and I gave him acetanilid to take during the night; I treated it again that morning with pyrozone, and the following morning. I saw nothing of him for a week. In the mean time I became a convert to the trichloracetic acid, and determined to try it on him; but when he came in, I found that the pocket had closed up, and here within a week and a half it has reattached itself and the pain is gone. The point is, that it is possible with these new remedies to get good results.

Dr. Kirk. Since I have gotten the result that I have noted with trichloracetic acid, and since I have found that it is possible to get a certain kind of restoration,—I mean a confirmation of the attachment that is already there, not necessarily reproduction of lost tissue,—I have reorganized my system of scaling teeth. I thought I had been doing it pretty well, but since I have been using the treatment noted I have been very much more careful to assure myself that every particle of tartar is removed. The point I wish to make is that after every part seems smooth, and I have considered that the root was clean, I have afterward found that it was not so by adopting the method of packing the pocket with cotton for a moment for the purpose of distending it, and then bathing the pocket with trichloracetic acid, which coagulates the surface so that no effusion takes place. You can then momentarily get a good look at the root-surface, when you will see any little particles of tartar which remain. You might build a telegraph line from here to San Francisco, and have it all completed with the exception of one inch, but a message could not be passed over the wire; and in like manner this disorder cannot be cured until the last granule of tartar is removed and the root is thoroughly clean. I have used trichloracetic acid as strong as ninety per cent., simply as an escharotic; but in pyorrhea I have used it only of ten per cent. strength. Trichloracetic acid is one of a group of similar acids; there are two others in the group, the monochlor- and the dichloracetic acids. I never have seen the other two, but they have similar properties, and the slight modification in their composition, due to the difference in their respective proportions of chlorin, might make some difference in the combination that would be of value in dental therapeutics.

A paper was then read by Dr. Edward C. Kirk, of Philadelphia, on the subject, "Sodium Peroxid (Na_2O_2), a New Dental Bleaching Agent and Antiseptic." (Published in full in the DENTAL COSMOS for March, p. 192.)

Discussion.

Dr. O. E. Hill. For instance, in a lower molar, in filling the cavity with sodium peroxid, is there a danger of its going through and causing trouble?

Dr. Kirk. I have had no trouble from this source. The constant evolution of gas that arises throws the solution out. If it were a very young tooth, and the foramina quite open, I might hesitate about using it; but in such an event it would be a clean burn, such as you would get from a hot iron, and would probably heal as kindly.

Dr. Hill. I don't remember that you stated just the strength that you would use this.

Dr. Kirk. I stated about fifty per cent. It is perhaps a failing of mine to use strong remedies in these cases, and a weaker solution would probably answer; but I have had no bad results in these cases. I mean by using a solution of the compound. It would not be advisable to use the dry substance.

Dr. J. P. Geran. I would ask if it would be advisable to close up the apex?

Dr. Kirk. For bleaching, certainly; I would prepare the tooth as for bleaching by any other process.

Dr. Geran. If the apex were open, would it produce an instant irritation?

Dr. Kirk. Only by the possibility of forcing some of the decomposing matter back into the soft tissues.

Dr. Hill. I would like to ask if in introducing this into the teeth it bleaches by destroying all the organic matter in the tubuli, and you really free the teeth from it?

Dr. Kirk. It is analogous to the effect that you get in the pyorrhea pocket by introducing hydrogen dioxid or pyrozone.

Dr. Ottolengui. I have been very much interested with this paper. I want to refer to a paper we had from Dr. Blackstone,* advising us to leave in the pulps and organic matter that we could not get out. In the discussion that followed, I suggested that in the future discussion of pulp-canals of teeth we should divide them into two classes, those accessible and those not accessible, and in speaking of filling pulp-canals speak only of those accessible, and then turn our attention to those which we could not get at. Let us admit that none of us get access to certain canals, and then find some way of treating them. I had not the least idea, two or three months ago, that the treatment of those inaccessible canals would be solved so quickly; for it seems to me that in talking about the bleaching properties of this agent we were overlooking a very much more important usefulness which will come out of this paper to-night. Here we have been shown an agent that will go into every one of the tubuli, destroying and dissolving the organic matter there contained, and also throw it out; and if that is true, we have here an agent for the complete sterilization of those fine canals in the distorted and narrow roots of molars which we cannot

* See DENTAL COSMOS for March, 1893, page 210.

penetrate. They are as much larger than the tubuli as they are smaller than the other canals. Here we have exactly the method which we are looking for,—a method of treating those inaccessible pulps medicinally by dissolving and ejecting their contents, at any rate sterilizing them; and it seems to me that this is one of the most important points brought before us, for it gives us a chance to do away with abscesses, and also to attack those cases where decomposition has gone further and reached the tubuli. It seems to me that we have here a remedy which, intelligently appropriated, will help us out in the treatment of the difficult cases noted, and I hope that end of the subject will be worked up rather than the bleaching, as we do not need to bleach teeth so much as to perfectly sterilize them.

WOMEN'S DENTAL ASSOCIATION OF THE UNITED STATES.

THE first annual meeting of the Women's Dental Association of the United States was held at the office of Dr. Mary H. Stilwell, 1300 Arch street, Philadelphia, Saturday evening, March 4, 1893. The following officers were elected for the year: Dr. Mary H. Stilwell, president; Dr. Anna K. Lettenmeier, vice-president; Dr. Eliza Yerkes, recording secretary; Dr. Annie T. Focht, corresponding secretary; Dr. Maria Lasser, treasurer; Drs. Elizabeth A. Davis, Hannah M. Miller, Bertha M. Jarret, Edith L. Brown, Emily W. Wyeth, executive committee.

At this meeting it was decided to make the association national, and the following vice-presidents were elected from each State represented: Washington, D. C., Dr. Edith Jewell; New York, Dr. Olga Neymann; Massachusetts, Dr. Anna T. Reynolds; Rhode Island, Dr. Jennie H. Gallup; Maryland, Dr. Frances Hoopes; Illinois, Dr. E. L. Benham; Wisconsin, Dr. May Clio Smith; California, Dr. Kate C. Moody.

From the original number, twelve, the association now numbers thirty-two, representing nine States. The next monthly meeting will be held April 4, at 1300 Arch street, Philadelphia. Dr. James E. Garretson, essayist.

ELIZA YERKES, *Recording Secretary*,
4004 Chestnut street, Philadelphia, Pa.

HARVARD ODONTOLOGICAL SOCIETY.

THE fifteenth annual meeting of the Harvard Odontological Society was held at Young's Hotel, Boston, Mass., Saturday, February 25, 1893, at 5.30 P.M.; the president, Dr. Jere E. Stanton, in the chair.

After the regular business had been transacted, the reports of the recording secretary, treasurer, and editor were read and accepted. After dinner had been served, forty-one members and guests listened to the orator of the evening, Dr. Forrest G. Eddy, of Providence, R. I., who gave an address on "Character in Professional Life."

Dr. Dwight M. Clapp, chairman of the committee on the Harvard Dental School, reported that the building fund was steadily growing.

President Stanton stated that regrets had been received from Hon. John Q. A. Brackett, ex-Governor of Massachusetts, Rev. Edward A.

Horton, Gen. Charles H. Taylor, and Mr. S. Albert Wetmore. He then introduced the speakers of the evening, — Rev. Dr. Moxom, Carl W. Ernst, A.M., assistant postmaster, Stephen O'Meara, A.M., of the *Boston Journal*, Rev. Dr. Greene, of Providence, R. I., David Hunt, M.D., and Samuel M. Child, Esq., who entertained the society with speeches admirably adapted to the occasion.

After the guests had departed, Dr. J. C. Ottinger, representing the Union Electric Works, of Chicago, Ill., exhibited "The Crowds Chemical Dental Outfit," which includes a battery, motor, drill, plugger, root-drier, and incandescent mouth-lamp.

The society then elected the following-named officers for the ensuing year: Forrest G. Eddy, D.M.D., Providence, R. I., president; Waldo E. Boardman, D.M.D., Boston, recording secretary; James Shepherd, D.M.D., Boston, corresponding secretary; Dwight M. Clapp, D.M.D., Boston, treasurer; Henry L. Upham, D.M.D., Boston, editor; Waldo E. Boardman, D.M.D., Washburn E. Page, D.M.D., Jere E. Stanton, M.D., D.M.D., Boston, executive committee; Jere E. Stanton, M.D., D.M.D., Dwight M. Clapp, D.M.D., Eugene H. Smith, D.M.D., Boston, committee on consultation. George F. Grant, D.M.D., Boston, was elected orator for 1894.

JAMES SHEPHERD, *Cor. Sec'y.*

3 Park street, Boston, Mass.

ALUMNI SOCIETY, PHILADELPHIA DENTAL COLLEGE.

THE annual meeting of the Alumni Society of the Philadelphia Dental College was held in the college building, March 8, 1893. The meeting was called to order by the president, Dr. Cryer. The recording secretary being absent, on motion of Dr. Garretson Dr. H. A. Ickes was made secretary *pro tem*.

The usual business was taken up and passed. The members of the graduating class for 1893 were elected members.

The subject for discussion was, "What Feels Pain?" It was discussed by many who were present.

The officers elected for the coming year were: Dr. M. H. Cryer, president; Dr. M. L. Long, first vice-president; Dr. S. H. Guilford, corresponding secretary; Dr. L. Greenbaum, recording secretary; Dr. J. N. Wunderlich, treasurer.

H. A. ICKES, *Secretary pro tem.*

ALUMNI ASSOCIATION, MISSOURI DENTAL COLLEGE.

THE Alumni Association of the Missouri Dental College (Dental Department of Washington University), held its annual meeting March 14, 1893, in the college building, Dr. DeCoursey Lindsley presiding. Drs. J. A. Hulen, W. E. Weller, J. L. Jenkins, P. W. Keller, and P. H. Morrison were elected members of the association.

The election of officers for the ensuing year resulted as follows: Dr. P. H. Morrison, president; Dr. W. G. Cox, vice-president; Dr. C. E. Schumacher, treasurer; Dr. T. L. Pepperling, secretary; Drs. Lindsley, Helmuth, and Bartlett, executive committee.

T. L. PEPPERLING, *Secretary.*

CHICAGO DENTAL CLUB.

At the annual meeting of the Chicago Dental Club, held January 23, 1893, the office of president was abolished, and in future a chairman will be elected at each meeting to preside. The only permanent officers now are the secretary and treasurer, to which Dr. E. L. Clifford and Dr. E. M. S. Fernandez were elected.

E. L. CLIFFORD, *Secretary*,
711 Venetian Building.

DENTAL COLLEGE COMMENCEMENTS.

NEW YORK COLLEGE OF DENTISTRY.

THE twenty-seventh annual commencement exercises of the New York College of Dentistry were held at Chickering Hall, New York city, on Saturday evening, March 11, 1893.

The valedictory was delivered by Ellison Hillyer, D.D.S., and the address to the graduates by J. Smith Dodge, M.D.

The number of matriculates for the session was two hundred and eighty-six.

The degree of D.D.S. was conferred on the following graduates by Wm. T. LaRoche, D.D.S., vice-president of the board of trustees:

Charles E. Aldous.
Francis J. Agramonte.
Henry R. Borst.
Fred. A. Bunting.
Lester G. Brimmer.
Herman W. Botein.
Edw. H. Berendsohn.
Ray P. Cummings.
Robert S. Carman.
Jan A. Chrzanowski.
Octavio J. De Silva.
Stanislaus A. Fischer.
Charles P. Gates.
William M. Gould.
Ellison Hillyer.

William H. Hickok.
Harry H. Hunt.
William F. Holmes.
Richard E. Harvey.
George A. Hammond.
Edward Hauck.
Thomas S. Jube, Jr.
Thomas A. Kiernan.
George W. Mellor.
Louis Meriam.
James M. Nash.
Michael N. Nagle.
Philip W. Prior.
John O. Peterson.
Addison S. Peters.
Harry L. B. Ryder.

Paul A. Reese.
William H. Russell.
William G. Sharp.
Louis F. W. Schrader.
Frederick L. Stanton.
Andrew J. Schuessler.
Chas. L. Starbuck.
Stephen V. Shea.
Morris H. Smith.
James O. Taylor, Jr.
Dudley H. Tenney.
Howard M. Vere.
George S. Wright.
Carl A. Williams.
Frank W. Wickes.

PHILADELPHIA DENTAL COLLEGE.

THE thirtieth annual commencement exercises of the Philadelphia Dental College were held in the college amphitheater, Philadelphia, on Wednesday, March 8, 1893, at 8 P.M.

The address to the graduates was delivered by Professor H. I. Dorr, M.D., D.D.S., and the valedictory by Charles Bergstresser, D.D.S.

The number of matriculates for the session was two hundred and eight.

The degree of D.D.S. was conferred on the following graduates by Ex-Governor James A. Beaver, president of the board of trustees:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
H. J. Bell.....	Illinois.	J. T. Miller.....	Pennsylvania.
Chas. Bergstresser.....	Kansas.	H. B. Nase.....	Canada.
W. E. Bowser.....	Pennsylvania.	C. W. Pitman.....	New Hampshire.
Wm. T. Butler.....	Pennsylvania.	W. H. Rothermel...	Pennsylvania.
W. D. Campbell, M.D....	Iowa.	F. H. Rowe.....	New Hampshire.
E. Carty.....	New Jersey.	Chas. Ryckman.....	Pennsylvania.
H. C. Crease.....	Canada.	E. M. Sanderson.....	Florida.
Geo. C. Davis, L.D.S....	Canada.	Edward P. Saunders.	Florida.
W. H. Hisey.....	Ohio.	Alfred Slocum.....	New York.
J. S. Hovland, C. Ph....	Norway.	Max R. Slough.....	Pennsylvania.
Louis N. Lemieux.....	Canada.	H. C. Sturdevant....	Pennsylvania.
John B. Mahn.....	Pennsylvania.	John C. Sullivan.....	New York.
E. S. Messinger.....	Pennsylvania.		

GRADUATED IN MAY, 1892.

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
F. D. Crosby.....	Nova Scotia.	Walter G. Van Horn....	Pennsylvania.
Clifford B. High.....	Canada.	Walter L. Yerkes.....	New Jersey.
Edgar R. Parker.....	Canada.		

VANDERBILT UNIVERSITY—DENTAL DEPARTMENT.

THE fourteenth annual commencement exercises of the Dental Department of Vanderbilt University were held in the chapel of the university, Nashville, Tenn., on Thursday, February 23, 1893.

The charge to the class was delivered by Professor W. H. Morgan, and the valedictory on behalf of the class by N. M. Burnett, D.D.S.

The number of matriculates for the session was one hundred and eleven.

The degree of D.D.S. was conferred on the following graduates by Vice-Chancellor W. F. Tillett, D.D. :

NAME.	STATE.	NAME.	STATE.
J. W. Baker.....	Alabama.	G. A. Hughes.....	California.
Thomas S. Brown.....	Alabama.	John A. Johnson.....	Nova Scotia.
James R. Beaucham.....	Mississippi.	John C. Minton.....	Texas.
N. M. Burnett.....	Tennessee.	Le Roy Rentz.....	Pennsylvania.
William G. Downs.....	Indiana.	James D. Smith.....	Illinois.

ALABAMA COLLEGE OF DENTAL SURGERY.

THE commencement exercises of the Alabama College of Dental Surgery, Bridgeport, Ala., were held at the Aldhous Building, February 24, 1893.

The degree of D.D.S. was conferred by Charles A. Holmes, president of the board of trustees, upon the following candidates, who had completed the third term : A. Irene Yokum, Sanford W. Allen, Henry Clay Stephens.

The valedictorian was A. Irene Yokum.

The number of matriculates for the session was fifteen.

Addresses were made by W. K. Spiller, dean, Rev. W. A. Coow, T. M. Allen, D.D.S., and the president of the board, Charles A. Holmes.

This college complies strictly with the rules of the Association of Dental Faculties.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE thirty-seventh annual commencement exercises of the Pennsylvania College of Dental Surgery were held at the American Academy of Music, Philadelphia, Pa., on Tuesday, February 28, 1893, at 12 o'clock M.

The annual address was delivered by Professor Wilbur F. Litch, M.D., D.D.S.

The number of matriculates for the session was one hundred and ninety-seven.

The degree of D.D.S. was conferred on the following graduates by I. Minis Hays, M.D., president of the board of corporators :

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Lottie E. Benton.....	New York.	Christoph Montag.....	Germany.
Frank Brandreth.....	Pennsylvania.	James Manning.....	Canada.
Solomon Cox.....	Pennsylvania.	Jeannette Oliver.....	New York.
J. C. Condict.....	New Jersey.	Thomas W. Powell.....	Pennsylvania.
F. Pierce Farrow.....	New Jersey.	A. M. Vernon Riggs.....	Pennsylvania.
H. K. Frontz.....	Pennsylvania.	Edwin Rogers.....	New York.
A. A. Gribbin.....	New Jersey.	John Richstoff.....	Sweden.
Matilda Groth.....	Pennsylvania.	Elton Stimmel.....	Pennsylvania.
Henry W. Harrison.....	Kentucky.	R. C. Talbot.....	Canada.
John D. Hertz.....	Pennsylvania.	H. H. Tory.....	Canada.
Sophie E. Küper.....	Germany.	William B. Warren.....	New Jersey.
Howard H. Laubach.....	Pennsylvania.		

KANSAS CITY DENTAL COLLEGE.

THE annual commencement exercises of the Kansas City Dental College were held at the Coates House, Kansas City, Mo., on Friday evening, March 3, 1893.

The faculty address was delivered by Professor Charles H. Lester.

The number of matriculates for the session was seventy.

The degree of D.D.S. was conferred on the following graduates by C. B. Hewitt, D.D.S., president of the faculty :

NAME.	STATE.	NAME.	STATE.
Andrew W. Davis.....	Kansas.	John H. Holke, M.D.....	Missouri.
W. H. De Witt Dwight.....	Iowa.	Richard J. Winn.....	Missouri.

MEHARRY MEDICAL COLLEGE—DENTAL DEPARTMENT.

THE seventh annual commencement of Meharry Dental Department of Central Tennessee College was held, in connection with that of the Medical Department, at the Gospel Tabernacle, Nashville, Tenn., in presence of an audience of over three thousand people. The graduates were S. R. Thompson, of Texas, and A. M. Wilkins, of Georgia, the valedictory address being given by the latter.

Seven students have been enrolled during the past session.

This is the only institution in the Southern States for the education of colored dentists. The graduates of former years from this school have been kindly received by the white dentists of the south, and have been well patronized by their own people.

OHIO COLLEGE OF DENTAL SURGERY.

THE forty-seventh annual commencement exercises of the Ohio College of Dental Surgery (Department of Dentistry of the University of Cincinnati) were held at the auditorium of the Young Men's Christian Association, Cincinnati, Ohio, on Wednesday evening, March 15, 1893.

The annual address was delivered by Dr. Dudley W. Rhodes, and the class oration by Charles Leslie Casey, D.D.S.

The number of matriculates for the session was one hundred and twenty-one.

The degree of D.D.S. was conferred on the following graduates by D. W. Clancey, M.D., D.D.S., vice-president of the board of trustees:

Pearl W. Applegate.
Jessie S. Bailey.
Sharon K. Bailey.
Charles L. Casey.
Richard A. Foley.

John B. Hayes.
John S. Hussey.
Francis A. Lush.
Max J. H. Martin.
Philip M. Offutt.

U. Clarence Purdum.
David E. Sheehan, Jr.
Victor Trager.
James C. Van Kirk.
Howard A. Whiteside.

AMERICAN COLLEGE OF DENTAL SURGERY.

THE seventh annual commencement exercises of the American College of Dental Surgery were held in the Grand Opera House, Chicago, Ill., on Tuesday, March 21, 1893, at 2.30 P.M.

The doctorate address was delivered by Rev. O. R. Gifford, and the valedictory by George T. Banzet, D.D.S.

The degree of D.D.S. was conferred on the following graduates by John S. Marshall, M.D., dean of the faculty:

William E. Allen.
Harry B. Adkins.
George J. Brown.
Ernst Busch.
George T. Banzet.
E. Lee Carter.
William J. Claassen.
Bert C. Delano.
Fred C. Dorsch.
Charles H. Foster.

Elmer E. Goudy.
J. F. Goodrich.
Mary C. Harter.
John Harler.
Jane L. Kelley.
Edmund W. Kester.
Adolphus E. McKenzie.
Kauffman L. Meyers.
John T. Murray.

Finley H. Mason.
Theodore Menges.
Henry C. Miller.
Captain H. McComb.
Frederick E. Pilcher.
William B. Pearson.
M. Antoine Sayler.
Julius C. Schneider.
Karl W. Woodward.

SOUTHERN MEDICAL COLLEGE—DENTAL DEPARTMENT.

THE sixth annual commencement exercises of the Dental Department of the Southern Medical College were held at De Give's Opera House, Atlanta, Ga., March 2, 1893, at 8 o'clock P.M.

The annual address was delivered by T. S. Powell, M.D., president, and the valedictory by R. A. Caswell, D.D.S., Florida.

The number of matriculates was one hundred.

The degree of D.D.S. was conferred by T. S. Powell, M.D., president, upon the following graduates:

NAME.	STATE.	NAME.	STATE.
C. J. Alvis	Alabama.	E. C. Smith.....	South Carolina.
H. E. Carpenter.....	Georgia.	William R. Tyler.....	Georgia.
R. A. Caswell..	Florida.	W. H. Treadwell.....	Georgia.
I. L. Dedge.....	Georgia.	C. G. White.....	South Carolina.

UNIVERSITY OF MARYLAND—DEPARTMENT OF DENTAL SURGERY.

THE annual commencement exercises of the Department of Dental Surgery of the University of Maryland were held at the Academy of Music, Baltimore, Md., on Thursday, March 16, 1893.

The mandamus was read by the dean, Professor Ferdinand J. S. Gorgas, M.D., D.D.S.; the address to the graduates was delivered by Rev. E. L. Watson, and the class oration by C. Howard Nicholson, D.D.S.

The number of matriculates for the session was one hundred and eight.

The degree of D.D.S. was conferred on the following graduates by Hon. S. Teackle Wallace, LL.D., provost of the university:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Fred. L. Arnold.....	Rhode Island.	Wm. Lee Davis.....	California.
S. DeLeon Avery.....	South Carolina.	William W. Farmer.....	Virginia.
William H. Barr.....	Canada.	Roland E. Loucks.....	Canada.
J. Edwin Boozer.....	South Carolina.	Willie E. Minghini.....	W. Virginia.
Samuel A. Boyd.....	California.	C. Howard Nicholson.....	Canada.
Samuel M. Byers.....	Pennsylvania.	John S. Rees.....	California.
Norwood G. Carroll.....	North Carolina.	Thomas R. Rowe.....	Rhode Island.
Henry Winter Davis.....	Virginia.	D. Fleming Sallis.....	Mississippi.

BALTIMORE COLLEGE OF DENTAL SURGERY.

THE fifty-third annual commencement exercises of the Baltimore College of Dental Surgery were held at Ford's Grand Opera House, Baltimore, Md., on Monday, March 20, 1893, at 2 o'clock P.M.

The annual oration was delivered by Rev. H. Allen Tupper, Jr., D.D., and the valedictory by Robert Franklin Taylor, D.D.S.

The number of matriculates for the session was one hundred and thirty-one.

The degree of D.D.S. was conferred on the following graduates by R. B. Winder, M.D., D.D.S., dean of the faculty:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
W. H. Gregg.....	Pennsylvania.	Milton S. Merchant.....	Texas.
Harry C. Griffith.....	Maryland.	Francis H. Mulholland.....	Wisconsin.
G. A. Hahn.....	Germany.	Luther M. Parsons.....	Maryland.
R. Edward Harbison.....	Pennsylvania.	Erwin S. Rinehart.....	Texas.
Charles S. Hoose.....	New York.	Andrew W. Soule.....	Vermont.
Claire G. Hamilton.....	Vermont.	Frank W. Shegogue.....	Maryland.
Albert C. Hays.....	New York.	John W. Thompson.....	N. Carolina.
Fred. Dwight Joy.....	New York.	R. Franklin Taylor.....	Canada.
Joseph Krainik.....	Roumania.	B. F. Wendell.....	Pennsylvania.
Charles A. Krantz.....	Maryland.	John Wood.....	New York.

DENTAL SOCIETY ANNOUNCEMENTS.

COMMITTEE ON EXHIBITS, WORLD'S COLUMBIAN DENTAL CONGRESS.

IMPORTANT NOTICE.

THE Committee on Exhibits for the World's Columbian Dental Congress desires to obtain rare specimens of growths, abnormalities, casts, illustrations of methods, instruments and appliances, both ancient and modern, whereby

the growth of the profession may be shown from its early infancy up to the present time. They also desire to exhibit an ideal library, operating-room, and laboratory, and to this end earnestly request all members of the profession, together with dental dealers and publishers, to loan them any specimens, instruments, books, appliances, photographs or pictures of societies and eminent men of all countries, together with anything and everything that will be of interest to any dentist from any part of the world. They will pay all transportation charges on such exhibits to Chicago and return, and will insure the same while on exhibition, if desired.

CHAS. P. PRUYN, *Chairman*, 70 Dearborn street, Chicago, Ill.,
 ARTHUR E. MATTESON, 3700 Cottage Grove avenue, Chicago, Ill.,
 E. M. S. FERNANDEZ, 36 Washington street, Chicago, Ill.,
 M. L. RHEIN, 104 E. Fifty-eighth street, New York, N. Y.,
 A. W. McCANDLESS, 1001 Masonic Temple, Chicago, Ill.,
 R. C. YOUNG, Anniston, Ala.,
 JAMES CHACE, Ocala, Fla.,
 W. A. CAMPBELL, Gold and Fulton streets, Brooklyn, N. Y.,

Committee.

Address all communications to Dr. A. W. McCandless, Secretary, 1001 Masonic Temple, Chicago, Ill.

COMMITTEE ON CLINICS, WORLD'S COLUMBIAN DENTAL CONGRESS.

As the clinic will be one of the principal features of the World's Columbian Dental Congress, the chairman of this committee desires to bring everything which is of value before that clinic. For this purpose, he respectfully requests members of the profession to inform him at once if they know of any valuable invention made in operative dentistry in their vicinity during the last three years. Also please state the name and the address of the inventor, and whether he is a reputable practitioner and belongs to a dental society.

DR. C. F. W. BÖDECKER, *Chairman*,
 60 East 58th street, New York City.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE Dental Society of the State of New York will celebrate its twenty-fifth anniversary with a three-days' session at Albany, May 10, 11, and 12, 1893. The usual number of essays and discussions by prominent men in the profession, historical reminiscences, etc., together with a dinner, will constitute the program. It is intended to make it rather a social than a scientific meeting, and it is hoped that a large number of the profession, both in and outside of the state, will be present.

For any information regarding the meeting, address the secretary, Dr. Charles S. Butler, Buffalo, N. Y.

The Board of Censors of the Dental Society of the State of New York will hold its annual meeting for examinations at Albany, on Tuesday, May 9, at 10 A.M. The law provides that "Said society shall admit to its examina-

tions, provided for in section eight of this act, only the following classes of persons, upon satisfactory proof of good moral character :

"First. All duly licensed and registered dentists of this state.

"Second. All persons coming from other states or countries who shall present to said society satisfactory proof of having been lawfully engaged in the practice of dentistry without the state for the term of six years.

"Third. All such persons as shall have studied dentistry for a term of four years in the office or offices of some reputable and duly licensed and registered dentist or dentists of this state and shall have in other respects conformed to the regulations governing such examinations, which regulations not inconsistent with this act said society may make and must publish at least twice in each calendar year in a leading dental journal."

The regulations require each applicant to bring a certificate of good moral character and professional standing from the District Board of Censors of the district in which he resides.

Applicants from without the State of New York must bring such certificate signed by the president and secretary of a reputable dental society in the state from which they come.

Candidates will be examined in anatomy, physiology, histology, pathology, therapeutics, oral surgery, materia medica, chemistry, metallurgy, operative and mechanical dentistry.

NEW JERSEY STATE DENTAL SOCIETY.

THE annual meeting of the New Jersey State Dental Society will be held at Asbury Park, on the third Wednesday in July, 1893.

The committees for 1893 are as follows :

Accommodations—C. A. Meeker, Fred. A. Levy, C. W. F. Holbrook.

Program—Charles A. Meeker.

Clinics—S. C. G. Watkins, R. M. Sanger, A. R. Eaton.

Exhibits—E. M. Beesley, C. W. F. Holbrook, Harvey Iredell.

Essays—R. M. Sanger, S. C. G. Watkins, F. C. Barlow.

Clinical Conference—B. F. Luckey, C. A. Meeker, F. C. Barlow, G. E. Adams.

Dental Literature—J. Allen Osmun, F. J. Kitchell.

Dental Mechanical Appliances—Wm. P. Richards, H. A. Hull, C. W. F. Holbrook.

Dental Materia Medica—Charles Harker, G. Carleton Brown, Thomas Moore.

Prosthetic Dentistry—Walter Woolsey, Wm. E. Truex, C. S. Hardey, C. M. Howe.

Transportation.—George C. Brown.

Press—Frederick C. Barlow, Wm. S. Holbrook.

Dissemination of Dental Literature—C. S. Stockton, J. W. Curtiss, E. J. Maynard, S. S. Hawley.

Legislative Committee—Fred. A. Levy, Chas. A. Meeker, F. C. Barlow, J. C. Clarke, Geo. C. Brown, R. H. Sheppard.

Entertainment Committee—B. F. Luckey, W. E. Truex, G. E. Adams, W. E. Linstead.

CHAS. A. MEEKER, D.D.S., *Secretary*,
29 Fulton street, Newark, N. J.

NEW BY-LAWS, PAN-AMERICAN MEDICAL CONGRESS.

LANGUAGES—By-Law IX. Papers may be read in any language, providing that authors of the same shall furnish the Secretary-General with an abstract not exceeding six hundred words in length, in either of the official languages (English, Spanish, French, or Portuguese) by not later than July 10, 1893, and providing further, that a copy of each such paper shall be furnished in either of the official languages, at or before the time of the meeting, to the secretary of the section before which the same shall be read. Remarks upon papers may be made in any language, providing that members making such remarks shall furnish a copy of the same in either of the official languages before the adjournment of the session.

PUBLICATION—By-Law X. All papers read, either in full or by title, shall be immediately submitted for publication in the Transactions (Special Regulation 3), but authors may retain copies and publish the same at their pleasure after the adjournment of the Congress.

CONSTITUENT ORGANIZATIONS—By-Law XI. All medical, dental, and pharmaceutical organizations, the titles of which have been transmitted with approval to the Committee on Organization, or which may hereafter be transmitted with approval to the Executive Committee, by any member of the International Executive Committee, each for his own country, shall be subject to election by the Executive Committee, approved by the President, as constituent bodies of the First Pan-American Medical Congress, and each organization thus constituted shall have the right to designate as delegates all of its members attending the Congress, but no such organization shall meet at the time and place of meeting of the Congress as a distinct body: providing that the secretary of each such constituent body shall furnish a list of officers and a statement of the number of members of his respective organization to the Secretary-General, not later than sixty days before the meeting of the Congress, and shall forward a list of delegates chosen to reach the Secretary-General before the opening of the Congress.

February 22, 1893.

BY THE EXECUTIVE COMMITTEE.

EDITORIAL.

THE EDUCATIONAL SIDE OF THE WORLD'S COLUMBIAN DENTAL CONGRESS.

OF the many results which may be expected to flow from the holding of the World's Columbian Dental Congress, perhaps the most important and far-reaching will be along educational lines. This in general is true of any similar dental gathering, but there are certain reasons why the congress in question is likely to achieve distinction in this regard over any other previously held. The World's Congress Auxiliary, under whose general auspices the dental congress is to be held, is an organization constituted for the purpose of showing forth the progress and condition of human intellect at the time of the World's Fair, just as the Fair itself is intended to demonstrate

the progress of human thought from the standpoint of its material expression. The keynote which defines the scope and purpose of the Congress Auxiliary is its motto : " Not matter, but mind ; not things, but men." In order to attain its object and comprehensively present a full view of the status of subjects within its scope, no less than one hundred congresses have been arranged for, under the Congress Auxiliary, to be held at suitable times during the progress of the Fair ; and it is believed that, in their entirety, these several congresses will represent every department of thought with which the human intellect has concerned itself. It is as a part of this liberal plan that the World's Columbian Dental Congress is to be held. Based upon such a broad foundation, with so exalted a motive, the dental congress, as in fact are all of the congresses, is at once lifted beyond narrow sectional lines. The vexed questions respecting the status of dentistry in relation to medicine, which have resulted in divisions of opinion and the consequent formation of the class distinctions among dental practitioners, must necessarily become of secondary importance in relation to the Columbian Dental Congress, simply by reason of its fundamental animating motive,—viz, to set forth the condition of dental science and art as it exists at the time of holding the congress. The very fact that diametrically opposite views are held as to the relations of dentistry and medicine furnishes, perhaps, one of the best arguments why such a congress as is contemplated should be held. The opportunity thus afforded for discussing this important question in the presence and with the help of the ablest thinkers in dentistry from all parts of the world, must have a decided value in enabling us to arrive at a better and more accurate judgment upon the issue than would be possible under less favorable circumstances or by less efficient means ; and this holds true with respect to the whole work of the dental congress. Further, the international character of the congress, taken in connection with the broad, catholic foundation upon which it is based, must tend to a general leveling upward of our American dental ideals through the wholesome corrective influence of contact with the high scientific standards for which our transatlantic *confrères* are so eminently distinguished. The greatest advances which have been made during the world's history are those which within the past century have been due to the civilizing influence which is the direct outgrowth of the various means afforded by modern science for the rapid intercommunication of nations and peoples. It is the same principle of thought communication that, in a degree, holds good with respect to the positive educational value which appertains to the holding of these meetings. This influence upon the thought of the profession, including not only the practitioner but the student, must be twofold, by reason of its educational effect upon the pro-

fession as a body, and especially upon those of its members who are teachers. The whole question of the constitution of the dental curriculum is dependent upon the character of the result which it is intended to produce ; and if it should finally be determined that the best practitioner of dentistry is that one who has been trained as a medical specialist, such a result cannot be attained through a curriculum formulated on the maxim that dentistry is a distinct and independent profession. The proposition is trite, but it is yet far from a satisfactory solution. May not the meeting at Chicago be expected to do much toward bringing order out of this chaotic problem? By totally ignoring the class distinctions which have grown up around practitioners who hold exclusively to either side of this question, by admitting to its deliberations all dentists who are reputable and legally qualified practitioners of whatever creed, by giving to each class unrestricted opportunity to demonstrate the best of which it is capable within the limits of its practice and culture regardless of its standpoint respecting the status of dentistry, in short, by a proper showing of the actual condition of dentistry in all of its relationships and from all standpoints, those who are its leaders of thought and the educators of students will be enabled to so intelligently direct their efforts that improved curricula, a higher ethical standard, and more rational and scientific methods of procedure must result. These are the ends of greatest importance, and those which, under the high animating principle of the congress, must be first attained. Anything less would be inconsistent with the motto of the Congress Auxiliary, from which the dental congress derives its guiding and governing sentiment.

Whatever may be the final result as to the status of dentistry, the educational value of the congress cannot be doubted ; this alone must surely do much toward advancing dentistry to the position where its best friends hope to see it, whether under the sovereignty of general medicine as its most highly developed specialty, or as a distinct and independent profession.

DRS. W. W. ALLPORT AND FRED. A. LEVY.

A TELEGRAM announcing the death of Dr. W. W. Allport, of Chicago, on March 21, has reached us barely in time for this brief mention. We regret to announce also the death of Dr. Fred. A. Levy, secretary and treasurer of the National Association of Dental Examiners, which took place at Orange, N. J., on the same date. Fuller notices will appear in our next issue.

BIBLIOGRAPHICAL.

A PRACTICAL TREATISE ON ARTIFICIAL CROWN- AND BRIDGE-WORK. By GEORGE EVANS. Third Edition, revised and enlarged. 8vo, cloth, pp. xv, 346. Philadelphia: The S. S. White Dental Manufacturing Co., 1893. Price, \$3.50.

Crown- and bridge-work begins where operative dentistry ends, and cannot be said to belong exclusively to either of the practical branches of dentistry, hence it demands and is entitled to a literature of its own. There can be no better evidence of the great activity of the dental profession than the fact that it requires a work of 346 pages to describe the recent achievements in crown- and bridge-work.

Dr. Evans's book presents all of the new methods, except perhaps the most recent work in removable bridges, which appeared probably too late to be included in its pages. It does not discuss the relative value of the different kinds of crowns and bridges, nor would such a course be admissible. Crown- and bridge-work does now and will continue to take high rank in dental art, and its successful practice must always depend upon sound judgment, knowledge of the principles of practical dentistry, and skill and precision in construction. It is these qualities which elevate it far above the plane of a mere mechanical trade.

It is not every writer who can clearly describe mechanical methods, nor can every reader understand written descriptions with distinctness; but this work, in addition to a carefully written text, contains six hundred and thirty-one illustrations, so that the reader cannot fail to obtain from its pages a very correct idea of the different methods of construction and adjustment of which it treats. To the dentist who would be well informed and up to date in crown- and bridge-work, Dr. Evans's book is indispensable, and it is equally valuable as a text-book for dental students. C. J. E.

CATCHING'S COMPENDIUM OF PRACTICAL DENTISTRY FOR 1892.

B. H. Catching, D.D.S., Editor and Publisher, Atlanta, Ga. 8vo, cloth, pp. 282. Price, \$2.50.

The plan and scope of this work, as well as the successive editions which have made their annual appearance, have received favorable notice from time to time in the DENTAL COSMOS. We take pleasure in again recommending the Compendium to the favorable consideration of the dental profession. The present issue shows an improvement upon former ones, both as a publication and in the professional work of which it is in its own field a reliable record.

OBITUARY.

DR. GEORGE WATT.

DIED, at Xenia, Ohio, February 16, 1893, of locomotor ataxia, GEORGE WATT, M D., D.D.S., in the seventy-third year of his age.

The death of Dr. Watt removes a prominent figure from the ranks of dentistry. He was eminent not only in the profession proper, but his fame as a teacher, as an editor, and as a contributor to dental literature will long endure.

Dr. Watt was born March 14, 1820, on a farm near Xenia, Ohio. He was of Scotch-Irish parentage, and a lineal descendant of James Watt, the perfecter of the steam-engine. He entered a boys' academy in Adams county, Ohio, in 1835, where he made rapid progress in his studies, which he pursued with great industry notwithstanding he also devoted about one-third of his time to work upon the farm. He continued his studies at a college at Ripley, O., leaving there in 1841 to engage in the study of medicine under the preceptorship of the late Dr. Samuel Martin, of Xenia. He entered the Medical College of Ohio in 1846, and graduated in 1848. He commenced the practice of medicine in Fayette county, Indiana, where he remained for some time, when a domestic affliction took him to Xenia, and after a short practice there he removed to Kenton, Ohio, where he practiced for about two years.

In 1852 Dr. Watt entered upon the study of dentistry, and his medical knowledge contributed in a marked degree to his rapid acquirement of this specialty. He formed a partnership for the practice of dentistry with Dr. J. Taft, of Xenia, and this relation continued for many years. During and subsequent to his medical studies he gave much attention to the subject of chemistry, and in 1853 he delivered a course of lectures on that subject in the Ohio College of Dental Surgery, at Cincinnati, at the same time becoming a member of the class he taught. He graduated with the class and received the degree of D.D.S. at the close of the term of 1854, and in 1855 he was elected professor of chemistry and metallurgy in that college, occupying this position for several years. Here it may be stated that he was subsequently dean of the college, and professor of pathology and therapeutics therein.

In October, 1856, Drs. Taft and Watt became proprietors and editors of the *Dental Register of the West*, published in Cincinnati, that journal being then in its tenth volume. This connection lasted for over fifteen years, until December of 1871, when Dr. Watt found it necessary to relinquish the field of editorial labor for the time being.

During the Rebellion Dr. Watt tendered his services to the government, and was for a time surgeon of the One Hundred and Fifty-fourth regiment of Ohio Volunteers. While in service he was disabled by an injury to the spine, which resulted in locomotor ataxia, on account of which he retired from the army and again entered into such practice as his feeble health would permit. In the autumn of 1865 he formed a partnership with Dr. N. W. Williams, which they conducted at Xenia for about one year, and established a branch office in Cincinnati, of which Dr. Watt took charge. In 1868 they purchased the dental depot of Walters & Co., in Cincinnati, conducting it in connection with their dental practice for about three years, when they sold it to Spencer & Moore, and in 1871 Dr. Watt again retired to Xenia and sought some rest from active labor. The connection with Dr. Williams having been dissolved, Dr. Watt formed a partnership with Dr. D. G. French, which con-

tinued for about a year, after which he formed a partnership with Dr. E. G. Betty, of Cincinnati, which also continued for about a year. He then formed a final partnership with Dr. W. H. Sillito, and this relation continued for about three years, when, his health having declined, Dr. Watt retired from active practice.

Not content to be idle, however, Dr. Watt in 1881 took the editorship of the *Ohio Journal of Dental Science*, a then new monthly periodical published by Ransom & Randolph, at Toledo. This labor of love he continued up to the time of his decease, and the pages of that journal attest not only the activity of his intellect, but the generosity of his heart in his treatment of his contemporaries.

A volume entitled "Register Papers: A Collection of Chemical Essays in Reference to Dental Surgery," by Dr. Watt, was published in Philadelphia by Dr. S. S. White in 1868. This was a reprint of his essays in the *Dental Register*, and was published in answer to many solicitations for detailed statements of his views on subjects therein discussed.

During his active career Dr. Watt was a member of many societies, among them the Mississippi Valley Dental Society, of which he was for several years secretary, and subsequently president; the American Dental Convention, of which he was vice-president; the American Dental Association, of which he was president; the Ohio State Dental Society, of which he was president for two years; the Mad River Dental Society, of which he was twice president, etc. In all of these he was popular, and took an abiding interest.

Among the things that Dr. Watt was instrumental in bringing to the notice of the dental profession, Dr. Sillito, his former partner, mentions the following: "He claimed priority in the discovery of the property of cohesion in gold at ordinary temperatures (in his crystal gold at Baltimore in 1853); the hot-air syringe for drying cavities (see *Ohio Journal*, vol. i, page 172), just after the meeting of the American Dental Convention at Cincinnati in 1855; also one of the first specimens of vulcanizable gutta-percha was made by Dr. Watt, and is in the possession of the writer. He designed the double hook elevator now sold for extracting lower molar roots, and also Watt's metallic base and flask."

Dr. Watt was married, April 17, 1845, to Miss Sarah Jane McConnell, of Greene county, O., near Xenia, who survives him with an adopted daughter, Mrs. Sillito. He was a member of the United Presbyterian Church. He was an affable man, and bore much suffering with patience and fortitude. His funeral took place at Xenia, February 18, 1893.

DR. JULIUS GUTTMAN.

DIED, at Great Falls, N. H., February 27, 1893, after a lingering illness, Dr. JULIUS GUTTMAN, in the sixty-sixth year of his age.

Dr. Guttman was born in the city of Brieg, in Silesia, Kingdom of Prussia, November 17, 1827. His father, Eliezer, was a prominent naval merchant, and his mother a descendant of the family of Werner. He attended the schools in his native city and of Leipsig, Saxony. Having chosen the profession of dentistry, he decided to come to America and fit himself for that calling. He landed in this country on the 14th of June, 1849, and in the same year began his dental studies with Dr. D. K. Hitchcock, of Boston. His

original intention was to return to his native land to practice, but after about four years' study in Boston he determined to remain in America, and connected himself with Dr. F. Fuller, of Portsmouth, N. H. In 1854 he established a practice at South Berwick, Me., and three years later removed to Great Falls, N. H., where he built up a practice which he continued up to the time of his death.

As a dentist, Dr. Guttman was a man of great skill, fully abreast of the times, and alive to the importance of thoroughly understanding new processes and methods. His work was careful and thorough, and he usually attained the best results. As a man and citizen he was honorable, intelligent, and patriotic, and came to take a deep interest in the institutions of the country of his adoption. He was a member of the New England Dental Association from its formation, and contributed in essays and practical work to its interest and prosperity.

Dr. Guttman was married in South Berwick, in 1855, to Miss Minna Des-sauer, who was a native of Muringen, Wurtemberg. They had nine children, one son and eight daughters, all of whom are now living. He was a member of the Masonic fraternity, and the impressive ceremonies of that order were performed at his burial.

DR. PHILANDER EVANS.

DIED, at his residence in Bangor, Me., February 10, 1893, after a short illness of acute phthisis, Dr. PHILANDER EVANS, aged sixty-four years.

Dr. Evans was born in Gorham, N. H., December 20, 1828. He had been a resident of Bangor for forty years. He studied his profession with Dr. Enoch Osgood, afterward purchasing the office and house of his preceptor, where he resided and practiced for thirty-five years. He married Mary A. Tibbetts, daughter of the late Edward Tibbetts. Dr. Evans was a Knight Templar, a member of the Royal Arcanum and Home Circle. He was a man of ability, thoroughly proficient in his profession, and his death is greatly regretted by all who knew him, his quiet, gentlemanly manners causing him to be held in the very highest esteem.

Dr. Evans was always a progressive man. He was among the first to use anesthetics in his practice, and perhaps the first to use ether in Eastern New England. He took a deep interest in the training of students, his office never being without them, and many who are now successful practitioners acquired the foundation of their dental education under his care. He was modest and unselfish, and his inventions and improvements, though many, were not generally known, but always freely imparted to his students.

DR. T. H. BURRAS.

DIED, at Patchogue, Long Island, N. Y., March 6, 1893, of heart-failure, T. H. BURRAS, M.D., M.D.S., in the eighty-first year of his age.

Dr. Burras was born in Varick street, New York city, April 6, 1812. He was a graduate of the New York College of Medicine, and commenced practice as a physician with Dr. Benjamin Kissam, of New York, in 1831. Turning his attention to dentistry, he opened an office for the practice of that specialty in Oliver street in 1837. In 1851 he purchased a home on Great Jones street, and remained there until 1882, when he removed to Lexington

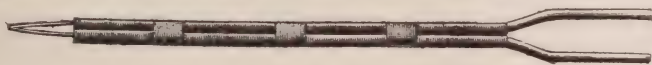
avenue for two years. Thus it will be seen that he was one of the oldest dental practitioners of New York, and years ago he became well known to the profession throughout the city and state. He retired to Patchogue in 1884.

Dr. Burras married Mary E. Hawkens, of New York, in 1839. She died about one year ago. They had three children, one son and two daughters, all of whom survive them. The doctor was a genial man, and quite popular with all who knew him. His reminiscences of old New York were often of great interest. His remains will be finally interred at Greenwood.

HINTS, QUERIES, AND COMMENTS.

DR. EMIL SCHREIER'S PREPARATION FOR TREATING PUTRESCENT PULP-CANALS.—The *Oesterr.-Ung. Vierteljahrsschrift*, October, 1892, contains a further communication from Dr. Schreier, in which he reports two hundred and twenty cases successfully treated by his preparation of potassium and sodium. In a private communication upon the subject, he states that in using the preparation the cork stopper should be removed from the tube containing it; this will leave exposed the paraffin layer covering the preparation. A barbed nerve-extractor is then to be pushed through this paraffin layer into the preparation. Upon gently withdrawing the instrument, small particles of the potassium and sodium compound will be found adhering to the barbs of the instrument, in which condition it is ready for introduction into the canal. Dr. Schreier advises care as to the use of the preparation, especially avoiding an excess at any one application; otherwise the action would be too violent. The dam should be applied in all cases without exception. The description of the method and the rationale of its action has already been published in the *DENTAL COSMOS* for January, page 22.

DR. GRAMM'S ELECTRODE.—The accompanying illustration shows the form of electrode used by Dr. Carl T. Gramm for heating the copper canal-points



in connection with eucalyptus oil and wax, as described in his paper read before the Chicago Dental Club and printed in full in the March *DENTAL COSMOS*.

HYDROGEN DIOXID.—The diagnostic value of hydrogen dioxid with respect to pus, as brought out in the paper by Dr. Charles B. Atkinson at page 330 of this issue, is a point upon which confusion has existed, and his observations upon this subject should be carefully noted. The effervescence which often ensues when hydrogen-dioxid solutions are brought into contact with the tissues of the mouth by no means indicates the presence of pus in all instances. The effervescence is due to decomposition of the hydrogen dioxid, and this may be brought about by contact with almost any dead and decomposing organic matter, and though the reaction quickly takes place in contact with pus, it will also take place just as actively in contact with venous blood, as noted by Dr. Atkinson, or with the inspissated mucus and dead epithelium and organic *débris* constituting furred tongue, or, in fact, any effete organic matter found in the mouth.

MANIPULATING OXYPHOSPHATE OF ZINC AS A FILLING-MATERIAL.—In manipulating the oxyphosphate of zinc there is often a great deal of chemical action manifested in the form of the evolution of heat at the time of crystallization or setting. Under such circumstances the cement sets very rapidly, so that it becomes almost impossible to introduce it into the cavity and useless in the setting of crowns. The rapidity of setting and the intense heat produced are no doubt closely related as cause and effect. Where this condition is controlled the setting of the cement takes place more slowly, and if time is allowed for the perfect chemical combination of the acid and the powder a much denser and more satisfactory resulting cement is obtained. My experiments and observations lead me to believe that there is an exact chemical relationship between the quantities of ingredients which go to make up the final cement, which, if accurately observed, will produce the most satisfactory results; and variations from these exact relations are the principal causes which produce unsatisfactory variations in the quality of the cement. To secure the right quantitative conditions between powder and liquid, and to control the crystallizing process, the preparation is mixed upon a large bottle containing ice-water. The larger the volume of cold, the more manageable the result as to the time of crystallization, cold undoubtedly retarding the process.

In summer-time much more satisfactory results are gotten by using ice contained in a wide-mouthed jar (a fruit-jar will answer), and after filling with ice pouring in ice-water, which fills up the interstices and forces the ice against the glass. Using this as a base for the working of cement on warm days, when under ordinary circumstances it would set so rapidly as to be worthless, will give all the time desired to do the work leisurely and perfectly. In very hot and dry weather, if the retarding action of the cold is once discontinued, the setting of the cement is extremely rapid. I have noticed that where I have used the cement which under ordinary circumstances would set so rapidly as to be practically valueless, its setting could be perfectly controlled by the use of the cold mixing base. In manipulating the quickly setting cement in this manner, I have frequently noticed the following interesting phenomenon: I have incorporated powder with the liquid until it has become as tough and thick as putty, or until it would take up no more powder on the slab, but upon removing it from the cold base and manipulating it between the fingers it would return to an extremely plastic and sticky condition, previous to again becoming hard through the process of chemical combination or crystallization of its combining parts. In crown-setting, it is my habit to place the crown upon the cold base, upon which I at the same time mix the cement, in order that they may both be at the same temperature. I have also noticed that when a jet of heated air is directed on a filling of oxyphosphate which is undergoing the process of crystallization, the resulting mass becomes friable, with a tendency to granulate, owing to the increased rapidity brought about by the high temperature. It would seem better, therefore, to use a current of cold air or that of ordinary room temperature upon such fillings rather than a hot blast.

Thus prepared, and manipulated with platinum-pointed instruments, to which neither it nor gutta-percha will stick, it will give results which I believe to be the best that can be gotten with any of the zinc cements.—H. G. REGISTER, Philadelphia, Pa.

PYROZONE.—Pyrozone, three per cent. aqueous solution of hydrogen di-oxid, may be used freely as a mouth-wash by both children and adults, also

as a gargle, although a considerable sensation of irritation follows in the throat. This is greater as congestion of the mucous membrane increases.

It is a valuable adjunct in caring for a frequent condition in children's mouths, where from malnutrition during gestation and the sundry eczemas of childhood the teeth become pitted or wasted of the enamel, by which cavities are exposed to the destructive influence of caries. The three per cent. both bleaches teeth in this condition, and retards the progress of the destruction.

As a mouth-wash for habitual use of smokers, the three per cent. is effective in removing the oily deposit so offensive to sight, and dangerous as an absorbent coating into which are deposited fluid food-products, possible of fermentation from which caries may result. As a wash and injection into large abscess-pockets, this three per cent. proves an excellent cleanser, and in many instances becomes all-sufficient as a means of cure.

The five per cent. pyrozone, ethereal solution, is a bleacher of teeth, entirely harmless both to the tooth-structure and myxomatous tissues. Its use on ulcerating surfaces secures a rapid reduction of the suppuration, and without a resulting coagulum. A special pyrozone atomizer has been devised which permits of a wide range of use for the ethereal solutions, and in aphthous patches, chronic congested fauces, and furred tongue, with their kindred conditions, a very much improved method of treatment is thus secured.

Twenty-five per cent. pyrozone, ethereal solution, is probably the best bleacher for teeth that has ever been offered. Its effect is exceedingly prompt, and the results are permanent. The process is not attended with pain unless the gums be touched, when a severe pricking sensation is produced, and a coagulum seems to form in most cases; but this will return to a normal condition if not abraded. In the deep pockets of pyorrhea alveolaris a small tent wet with this twenty-five per cent. will be found sufficient in most cases to terminate the suppuration, and in other abscess-pockets, as those of the alveolus, and in the treatment of putrescent root-canals, the concentration of the twenty-five per cent. pyrozone enables a minute quantity to be placed *in situ* with comfort to the patient and an effective result for the operator. One result of the action of pyrozone, as of other preparations of hydrogen dioxid, deserves attention in its connection with discriminative diagnosis. When brought into contact with venous blood, a free, somewhat discolored froth appears, which may readily be supposed to indicate pus. If this be true in every instance, it would be evidence of a circulation of leucocytes, and indicate a systemic debility only awaiting local irritation to be called into activity. This action, taken with the increased activity at congested points when pyrozone is topically applied to a suspected site of disease, adds a valuable corroborative diagnostic aid to the many uses of these oxygen conveyors, whose field expands constantly as familiarity with them increases. Another point for differentiation occurs in the action of pyrozone upon organic accumulation in the mouth and about the teeth. Froth does not necessarily indicate pus, but may simply be the activity of oxidation of organic accumulation.

A first use of pyrozone, three per cent., except the presence of pus is otherwise evident (demonstrable upon pressure if concealed within a pocket, or by palpation if in an abscess, or by sight if exuding), is to cleanse the territory by bathing or rinsing, followed by removal of all froth which appears. Then the pyrozone, three, five, or twenty-five per cent., may be used as an indicator of pus, as the surfaces will be clean and its action unobscured by surface accumulation.

In lacerated and incised wounds, recent and chronic abscesses, deep and superficial, ulceration of the myxomatous tissue and of the epidermis, and on normal tissue, the twenty-five per cent. pyrozone has been exhaustively tested during the past ten months to determine a caustic effect. In sixty-one cases embraced in the above category no single instance of coagulation has occurred. The white *apparent* coagulum appears immediately with very considerable pain, which latter is much less on mucous membrane than on the skin, and subsides more rapidly, ease succeeding in five minutes on mucous membrane. On the skin the pain subsides in seven minutes, followed by a throbbing sensation for about three minutes longer, when ease is secured. In from ten to fifteen minutes the normal tint returns on the mucous membrane. In about thirteen minutes the beginning of return to normal tone of color will be noticed on the skin, which progresses with increasing rapidity for one hour and a quarter to one hour and a half, when the bleaching effect passes off. A circumscribing territory of congestion accompanies the application of the twenty-five per cent. pyrozone to the skin, which persists as a red spot, gradually narrowing its limits for a period of two to three hours after the application, varying with the susceptibility of the skin. The persistence of the bleach for an hour and a half is considered excessive, the normal tint being usually recovered in less than one hour. The *apparent* coagulum is believed to be due to the extreme activity of the liberation of the oxygen, which element, combining with the effete accumulation in the venous blood column, adds the specific bleach of the oxygen to the compression due to the activity of the dismemberment of the pyrozone molecule driving the blood back, and upon the return of balance of pressure in the local circulation the normal color is re-established, no permanent change of normal tissue occurring. Herein lies the perfection of this seeker of the effete. It is death to extraneous organic matter, and life to healthy tissue, which it only temporarily irritates while engaging the enemy.—CHARLES B. ATKINSON, New York, N. Y.

TOOTH IMBEDDED IN ANTRUM.—At a regular meeting of the First District Dental Society of the State of New York, held at the New York Academy of Medicine, November 8, 1892, Dr. Kasson C. Gibson reported a case as follows:

"The patient, a gentleman about thirty years of age, presented himself at my office in March, 1880. A few months previously he had taken gas for the purpose of having an upper molar on the right side extracted, the tooth having been ulcerated, giving him a great deal of trouble. On examination, it was found that all the teeth posterior to the right cuspid had apparently been removed. There was also an opening at a point corresponding to the place occupied by the second molar; through this opening a probe could readily be passed into the antrum. At times there was a very offensive discharge from the right nostril.

"The treatment of the antrum consisted principally of syringing with warm water and salt morning and evening. This the patient was able to do himself, continuing it from March until November, 1880. It was then decided to enlarge the opening into the antrum. On November 9, the patient was etherized and the operation performed by Dr. J. D. Bryant, a surgeon. Considerable necrosed bone of the floor of the antrum was found and removed, leaving a large opening into the antrum. After the operation, the patient

continued using the salt and water for cleansing the antrum. At times he suffered greatly, was very nervous, and broken down in health. Finally, a few weeks after the operation, on making an examination of the antrum with a probe, I found what I supposed was more necrosed bone. We went to Dr. Hasbrouck's office, where gas was administered to remove it. The supposed necrosed bone proved to be a tooth.

"Our theory was that when the tooth was, as he supposed, extracted, it was broken, and in the second attempt to extract it was forced into the antrum. (See illustration.) It is badly decayed and fractured, and a part of the palatal root is missing. The patient had no further trouble. A partial plate of vulcanite was made to supply the missing teeth; this also acted as an obturator, as the opening into the antrum, although healed, never entirely closed."



TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—In Dr. V. H. Jackson's remarks on Dr. French's paper on regulating, as reported in the February number of the DENTAL COSMOS, he speaks of using the same device, at a new stage of the operation, by attaching new springs, etc. In the tedious matter of expanding either jaw with split plates, I vulcanize in different places on the lingual aspect of the plate pieces of gold ends of a horseshoe-shaped piece of piano-wire, which forms an extra spring in such a position that, when withdrawn, the slot left serves to hold the wire. By this means force can be applied at any point; it can be continuous or intermittent, and changed as occasion requires.

I make the spring that is vulcanized into the two halves of the plate, of the ordinary size, No. 7 or 8, British gauge, but the removable one of pin-wire size, and as a rule the patient wears the extra spring at night only, the ordinary spring retaining what space is gained by the removable one.—CHARLES RATHBUN, London, Eng.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—I herewith send you four superior incisors very recently removed from the mouth of a Swiss lady of thirty years of age; nervo-bilious temperament. She lived in her native country until about seventeen years old, when she came to this. At the age of twenty-two, the left central incisor was filled with gold upon the labial surface, where there is now a plastic filling. At the time of the introduction of the gold, the tooth was so loose that the dentist hesitated about filling it.

These, as will be seen (see illustration), are *permanent* teeth, with a resorption of the roots beginning at the apex and advancing toward the neck, in the same manner as that of the deciduous teeth; and this process of resorption and loosening has been going on for several years, until the left central became so loose that she picked it out, and then came to me, when I removed the remaining three.



She has never suffered a moment's pain with them in any way. There has never been any ulceration in connection with these teeth, and there was none at the time of their removal. There *was* a fistulous abscess in connection with the right cuspid, which she says was the only thing of the kind she ever had; but as that tooth was firm in its socket, and the root of good length, I injected

through its canal carbohc acid which was forced out through the fistula, and it has now closed up entirely, and the soft tissue has regained its normal appearance. There has been no undue swelling of gum-tissue about these incisors. There was at the time of their removal a slight fullness of gum-margins, with considerable redness. As you will observe, I have not split either of them open to look after their pulps, though I could but remark their life like appearance before removal. She remembers well when she lost her deciduous set and the eruption of these. She has always enjoyed good health, as she does now; never had a severe sickness of any kind since she was seven years old, at which time she had scarlet fever so badly that both family and physician gave her up to die. Has never known of any family constitutional disturbance of any kind, and there is certainly no manifest syphilitic taint in her case, unless *this* can be enumerated as one of the signs or symptoms. She has no recollection of these teeth ever having sustained any injury, such as contusion or any violent force of any kind. There has been no undue pressure, such as we find producing resorption of deciduous roots, or the overlying of some retarded tooth or tooth in malposition. The alveolar process is manifestly healthy, and gum-tissue healing very nicely. She has lost two upper bicuspids and one molar in the same way. Her mother lost all her teeth early in life, but she cannot remember that the roots were resorbed as these. In a practice of over twenty-five years, I have never seen a similar case; and the question naturally arises, What is the origin of this peculiar resorption? Can it begin back at seven years of age, with scarlet fever, arresting or thwarting the functions of pericementum or pulp-tissue?—I. D. PEARCE, Kansas City, Mo.

FURTHER experiments with sodium peroxid tend to confirm its value as a bleacher and detergent of dentine holding putrescent organic matter. While it is too soon to determine the permanency of its bleaching effect, it may be said that where a tendency to secondary discoloration has been shown, the presence of putrescent matter in the tubuli is demonstrable, which, when removed by a second treatment, has terminated the tendency to a recurrence within the limits of observation so far possible.—EDWARD C. KIRK.

IMPRESSION trays may be perfectly cleaned, after using modelling composition, by boiling in sal-soda water.—F. A. GREENE, Geneva, N. Y.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY, 1893.

- February 7*.—Nos. 491,097 and 491,098, to A. P. GOULD. Dental chair.
 “ “ No. 491,099, to A. P. GOULD. Dental engine.
 “ “ Nos. 491,316 and 491,317, to LOW & DAHL. Tool-holder.
 “ “ No. 491,461, to C. E. BLAKE, Sr. Forceps.
 “ “ No. 491,499, to S. P. SHARP. Angle tool.
 “ “ No. 22,441, Trade-Mark, to W. H. FARRAND. Dentifrice.
February 14.—Nos. 491,514 to 491,519, to C. E. BLAKE, Sr. Forceps.
 “ “ Nos. 491,610 and 491,611, to D. STUCK. Chair.
 “ “ No. 491,932, to A. WHITLOCK. Forceps.
February 21.—No. 492,050, to MAX SICHEL. Cement.
 “ “ No. 492,266, to A. W. BROWNE. Flexible shaft.
February 28.—Nos. 492,432 and 492,433, to C. E. RHONE. Dental engine.
 “ “ No. 492,434, to A. S. RICHMOND. Syringe.
 “ “ No. 22,542, Trade-Mark, to S. S. WHITE DENTAL MFG. CO. Dentifrice.

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No. 5.

ORIGINAL COMMUNICATIONS.

MASTICATION IN MAN.

BY HANS BLOCK, DRESDEN, GERMANY.

(Continued from page 266.)

GENERAL RULES REGARDING THE TEETH AND GUMS.

Relation between Appearance and Function.

The teeth in every species of animals are expressive of their history, evolution, dietetic character, method of breathing and locomotion, as well as of their osteological structure, and even of their soft structures (like the brain and skin).

The shape of the human teeth is typical. Each tooth has that form, size, and strength best adapted to its special office, so that the function of the teeth is indicated by their shape.

The teeth, however, serve not only for mastication, but also for speech, and for the formation of the features. They are a characteristic of beauty, health, temperament, age, sex, and even of character. They govern the expression of the lower half of the face, and indicate the hereditary family traits.

"The teeth of every person possess in their position, form, and color more or less individuality, and most of those peculiarities which stamp their individuality are inherited."—*Dr. Kingsley*.

This "individuality" has been classified under the name of temperament. Temperament is a coefficient of intellect and health, and hence a unique characteristic of man, as neither intellect nor disease is more than slightly manifested in the lower classes of animals.

Color of Teeth and Gums.

Temperament is expressed in the general form, arrangement, and color of the teeth and gums.

"All teeth are translucent and variably yellow at the neck. They become darker from the cuspids posteriorly. Cuspids are always more yellow than

incisors and bicuspid, and molars are darker still. Usually there is more yellow in the lower than in the upper teeth."—*Dr. Haskell.*

"Fair teeth are admissible in younger persons; deeper hues are required for the aged. The canine teeth in nature are less translucent and more deeply shaded than the incisors or bicuspid.

"The fault of many of the porcelain teeth of this country is a lack of translucency, which a little more heat in baking would very much improve"—*Dr. Kingsley.*

"Artificial teeth never match in translucency the natural living teeth, and this lack has become more marked within the last twenty or thirty years, as in this respect the dental depots have made no progress, but have become more deficient."—*Dr. Beale.*

Age darkens the teeth.

"The centrals are lightest in color and the cuspids a shade darker, with a difference in color of all the back teeth."—*Dr. Bonwill.*

"The color of the permanent teeth is rather yellow, that of the deciduous blue."—*Dr. Parreidt.*

"The gum-margins form along the outer surfaces of the dental circle beautiful and regular festoons, with a very thin edge around the teeth."—*Dr. Harris.*

"The gum is pale in chlorosis and anemia; of a purple-red color before an active hemorrhagic discharge and in cases of dysmenorrhea; of a dark red color, spongy, and bleeding readily in scurvy and diabetes mellitus, and after the use of mercury."—*Prof. Schill.*

"There will be a slight diminution of the pale rose-red color in the gums after the age of puberty until the climacteric period of life, when they will again assume a somewhat redder appearance."—*Dr. Harris.*

That part of the gums which forms the half halo around the necks is not red, nor pink, but nearly white.

Characteristics of Teeth in General.

"Nearly every natural tooth has an inverted-cone shape."—*Dr. Parr.*

"The first upper molar is the most complex of the human teeth, and the lower second molar is the simplest tooth-form in the mouth."—*Dr. Black.*

"The lower molar is more highly developed than the upper."—*Dr. Allen.*

The posterior tooth is always more rounded in contour than its anterior fellow.

"The labial surfaces of the teeth always show a greater curvature on their mesial half than on their distal.

"The approximal surface joins the morsal surface at a different angle,—*i e.*, the mesial side of the tooth is more angular, the distal side more rounded, at the union with the morsal side."—*Dr. A. Pallauf.*

"The points of the roots of permanent teeth are always curved toward the adjacent posterior neighbor."—*Dr. Iatrick.*

"In thickness the teeth increase from incisor to first molar, and decrease again from there to the third molar.

"The upper molars are by three mm. thicker (bucco-lingually) than the lower molars."—*Dr. Zuckermandl.*

Dr. Black's measurements show an advance in thickness of only one and a half mm. of the upper over the lower molars.

"The enamel-surface of the front teeth is longer on the palatal than on the labial face, but in the back teeth the larger enamel-surface is on the buccal side."—*Dr. Starr.*

This statement (as far as its latter half is concerned) is not confirmed by Dr. Harris, who writes: "The alveolus is usually a little higher on the exterior edge of the jaw than on the interior."

"We often find the molars considerably shorter than the bicuspid."—*Pacific Dental Journal*.

But this, it should be added, is not normal.

"The summits of the crowns have, when normally developed, approximately the same level, the canines not excepted."—*Dr. Wortman*.

"There is a regular relation between the thickness and length of the crowns and that of the roots. The longer the crowns, the shorter are the roots, and in reverse; short, thick crowns indicate very long roots."—*Dr. Hollaender*.

The sixteen upper teeth correspond more or less in their length to the lower teeth (as the length of the cuspid only surpasses that of any other tooth because its root is five mm. longer), but the length of the other twenty-eight teeth is nearly equal.

The breadth of the three lower molars (mesio-distal) is, according to Dr. Black, four mm. in total, longer than the breadth of the three upper molars, but the width (bucco-lingual) of the three lower molars is by four mm. shorter than the width of the three upper molars.

Dimensions of Individual Teeth.

"In the lower jaw the laterals are broader than the centrals.

"The lower bicuspid is smaller than the upper, and have a more square-like morsal surface.

"In the lower jaw the first bicuspid is the smaller, the second the larger one."—*Dr. A. Paltauf*.

"The inferior second bicuspid has a thicker crown than the first.

"The crown of the first superior bicuspid is a little smaller than that of the second."—*Dr. Patrick*.

"The second bicuspid is generally smaller."—*Dr. Kingsley*.

"The superior second bicuspid is smaller than the first."—*Dr. Starr*.

"The upper second bicuspid is smaller than the first, the root a little longer."—*Dr. Black*.

"The roots of the upper second bicuspid are shorter than that of the first bicuspid."—*Dr. Hollaender*.

The dental depots do not seem to understand this, for they make in upper sets the second bicuspid larger than the first, or both equal.

"The lower first bicuspid is the smallest of the bicuspid. Crown and root is a little longer in the second lower bicuspid than in the first."—*Dr. Black*.

"The first molar is the largest and broadest of all."—*Gray*.

"The first superior molar is the largest."—*Dr. Patrick*.

"The second or third molar is larger than the first."—*Dr. Potter*.

"The second molar is a little smaller than the first."—*Gray*.

"The superior second molar is smaller than the first."—*Dr. Starr*.

"The second inferior molar is smaller than the first. The third molar is generally the smallest."—*Dr. Patrick*.

"The third molar is smaller than the others."—*Gray*.

"In the upper jaw the third molar is, as a rule, smaller than the other molars. In the lower jaw it is rarely smaller, but in most cases larger than the first or second molar."—*Dr. Hollaender*.

"In the lower jaw the three molars in the more typical lower races are equal in size; in the higher races the third molar is usually smaller."—*Dr. Wortman*.

"The upper third molar is usually smaller than the lower third molar, and extends over its distal surface."—*Dr. Black*.

"The inferior first molar is the largest of the entire series."—*Dr. Starr*.

"The first molar is always the largest one, the third molar is the smallest."—*Dr. A. Paltauf*.

The same statement is made by Dr. Harris.

Dr. Black's measurements of the molars show that in the upper

jaw the breadth (mesio-distal) is one to two mm. smaller than the thickness (bucco-lingual), but in the lower jaw the breadth is one to one-half mm. larger than the thickness.

Morsal Surfaces.

The change of the morsal surfaces in extent and form is a progressive one, and is in direct accord with the forces and resistances to which the teeth are subjected in their work. It will be observed that even the incisors possess tubercles, which become more defined in the cuspids, and appear fully developed as cusps in the bicuspid and molars, hence from cuspid to molar the change is a progressive one.

Toward their disto-lingual corner all teeth show a slight recession and rounding of their morsal surfaces.

"The lower three molars on their posterior side have a distinctly marked tuberosity."—*Dr. Bogue.*

The even morsal surfaces of the upper front teeth are on a plane with the free margin of the lips.

"The unevenness of the morsal surfaces of the back teeth recurs at regular intervals."—*Dr. Davenport.*

"Each jaw is a perfect matrix for the other."—*Dr. Dwinelle.*

Cusps.

The cusps of the human denture are neither sharp-pointed nor recurved.

"Since the cusps exist before the roots, the latter may be said to be conformed to the cusps, so that to every cusp there is a tendency to form a distinct root. It is, best, therefore, to study teeth by their cusps."—*Dr. Harrison Allen.*

"The cusps of the superior set considerably exceed the lower ones in size."—*Dr. Wortman.*

"The inner cusps of the upper back teeth are longer than the outer. Their outer cusp is more acute, the inner rounded; the lower the reverse, inner sharper and outer rounded."—*Dr. Bonwill.*

Contradictory to this, the *Pacific Journal* says, "The inner cusps are lower than the outer."

"In the upper bicuspid the buccal cusp is slightly larger and more elevated; the palatine cusp is thicker and more rounded."—*Dr. Wortman.*

"The external cusps of the bicuspid and molars are larger than the internal."—*Dr. Patrick.*

"In the upper and lower bicuspid and molars the buccal cusp is always higher than the lingual."—*Dr. A. Paltauf.*

"From the cuspid the cusps are less to the second molar."—*Dr. Bonwill.*

"The inferior first bicuspid is a sort of stout cuspid."—*Dr. Dean.*

"The first bicuspid in the lower jaw has but one cusp."—*Dr. Bonwill.*

And they both could add: "And this cusp is not pointed, but rounded."

"The superior cuspid ends in an obtuse angular point; the inferior cuspid has a dull-pointed crown."—*Dr. Patrick.*

"The crown of the cuspid is terminated by an obtuse point."—*Dr. Wortman.*

"The lingual cusps of the lower bicuspid and molar of artificial teeth, such as are now made, are universally too short."—*Dr. Bonwill.*

"The inferior second bicuspid is provided with three cusps, two buccal and one lingual."—*Dr. Starr.*

"The superior three molars have quadritubercular crowns (with two outer and two internal cusps), but in many examples the postero-internal cusp is little more than a cingulum.

"The crowns of the lower three molars support four principal cusps, together with a fifth one behind."—*Dr. Wortman*

"Upon the grinding-surface of the superior first and second molars there are four protuberances. The two external are generally the largest, the internal the smallest.

"The crown of the superior wisdom-teeth frequently has only three cusps, two external and one internal.

"The crown of the first inferior molar is divided into five protuberances, two internal and three external.

"The second inferior molar crown has always only four cusps, two internal and two external.

"The third inferior molar usually has four cusps, but frequently five."—*Dr. Patrick.*

"The upper molars yield four cusps (excepting the third molars, which are variable).

"The first lower molar is commonly composed of five cusps, of which the outer row yields three and the inner row two.

"The second lower molar is composed either of five cusps, of which two are on the outer row, two on the inner, while the fifth is on the posterior border, or the tooth is composed of four cusps only."—*Dr. Harrison Allen.*

"The first permanent superior molar (like the second deciduous molar) has four cusps.

"The second and third permanent superior molars have but three cusps."—*Dr. C. N. Peirce.*

"The second superior permanent molar nearly always has four cusps."—*Dr. S. H. Guilford.*

"In the lower jaw the first permanent (like the second deciduous) molar has five cusps, the second permanent four, the third permanent five."—*Dr. C. N. Peirce.*

"The superior first molar has four cusps, two buccal, two palatal. The anterior buccal cusp is the longest of all. The palatal cusps are broader than the buccal."—*Dr. Starr.*

"The superior first molar has four cusps, the second also four, sometimes three."—*Dr. Hollaender.*

"The first molar has four to five cusps."—*Dr. A. Palttauf.*

"The crown of the first molar has three outer and two inner cusps."—*Gray.*

"The inferior first molar has five cusps, three buccal, two lingual."—*Dr. Starr.*

"The second molar has four cusps in the upper and five in the lower jaw."—*Gray.*

"The upper second and third molars have mostly three cusps only."—*Dr. A. Palttauf.*

"The inferior second molar has four cusps, the longest of which is the anterior lingual, and the shortest the posterior buccal."—*Dr. Starr.*

It is surprising that not even upon the number of cusps, can reliable records which agree in all particulars be obtained from the authorities!

Prominent Positions.

"The canines are placed immediately behind the angles of the mouth."—*Dr. Parreidt.*

"The crowns of the canines lie under the corners of the mouth."—*Dr. Kingsley.*

"The bicuspids scarcely show from the front."—*Dr. Walker.*

"The cuspids stand a little prominent, giving a fullness to the corners of the mouth."—*Dr. Black.*

"The arch at the cuspids stands more prominently than any other teeth."—*Dr. Bonwill.*

"Of the six front teeth, the cuspids are generally the most prominent,

especially at the neck. The bicuspid drop inside a trifle of the range of the canines."—*Dr. Haskell.*

"The body of the canine presents more of the mesial surface because it is a little thrown out."—*Pacific Dental Journal.*

"Behind the upper centrals is the orifice of the anterior palatine canal, through which pass the palatine arteries.

"Opposite the upper second molar opens Steno's canal, the duct of the parotid gland.

"Just below the root of the lower second bicuspid is placed the mental foramen, which gives passage to the mental nerve and artery."—*Gray.*

"Immediately behind the central incisors of the lower maxilla, on the median line, I have found foramina analogous to the anterior palatal in the upper maxilla. These are not figured in Gray or any other work, but seem to be constant in the bones. It would seem probable that small branches of the vessels (inferior dental vessels and nerve) passing through the inferior dental canal here find an outlet and supply the adjacent soft tissues."—*Dr. Ottolengui.*

Approximal Contact.

"The adjacent teeth touch each other, to prevent food from passing between."—*Dr. Ottolengui.*

"The teeth of each jaw, in a perfectly normal state, form an uninterrupted series in close juxtaposition, and all of nearly equal length. In this particular man differs from all other animals."—*Graham.*

It is known that even in the anthropoid apes all teeth do not stand in approximal contact, and that this contact which distinguishes man is a decided beauty.

"The normally arranged human teeth touch all around in both arches."—*Dr. Davenport.*

"The teeth are uninterrupted at any point by the intervention of diastemata or spaces."—*Dr. Wortman.*

Dr. Walker publishes the following opinion: "A little space judiciously given will generally tend to a more natural appearance. The most space should generally be left between the centrals and laterals. The latter should be a trifle shorter than the former, and just a trifle out of line."

The same hints are given by many other practitioners; but what do they intend? They try to produce an irregularity not large enough to be called a monstrosity.

It seems that experts in general are fond of irregularity in their prosthetic work. Dr. Bonwill says he arranges irregularly, and Dr. Haskell also states that irregularities always give a natural appearance. If such policy should be uniformly followed by all dentists, so many persons would at last wear sets of irregular arrangement that even natural irregularity would be suspected to be artificial.

"The more regular the features," says Dr. Kingsley, "the more difficult it is to avoid regularity in setting artificial teeth without producing deformity, for deformity is only relative, and what would deform one would enhance beauty in another." This shows that Dr. Kingsley also thinks imitation of defects is admissible, and he gives important advice in this direction in his book.

"In bicuspid the contact is with the buccal angles. In molars it is removed rather more to the lingual, but in the best formed denture it will be found nearly in line with the buccal cusps.

"The mesial surface of a tooth is nearly flat at the contact point, while the distal surface of the neighboring tooth is sharply rounded."—*Dr. Black.*

In the upper and lower molars the approximal surfaces are more rounded

and narrow on the distal side, and more flat and broad mesially."—*Dr. A. Pallauf.*

"The actual contact surface of the teeth is a small rounded point; but as the teeth have a certain, whenever restricted, amount of motion in their sockets, the contact points are rubbed in mastication, and become flattened by wear."—*Dr. Black.*

The Gum.

"In the mesio-distal direction all of the teeth are a little broader at or near their occluding surfaces than at their necks.

"Their proximate surfaces leave V-shaped openings between the necks. These interproximate spaces are filled with gum-tissue. The gum comes up to the contact point in a sharp margin.

"The average sum of the interproximate spaces measures one and a half inches in an arch measuring five inches. The interproximate spaces vary much in width.

"The gum-pedicle is fullest in that portion which is central between the teeth"—*Dr. Black.*

"The pedicle is the thickest part of the gum-tissue."—*Dr. Ottolengui.*

"The length of the gingivæ (that is, of the free margin of the gum) from the attachment to the neck of the tooth varies from one to four mm.

"The gingival line of the teeth is at the border of the enamel and cementum. As age advances the gingivæ become shorter, showing more of the crown."—*Dr. Black.*

The Gum-Line.

"The roots of the cuspids are prominent toward the lip."—*Dr. Black.*

Consequently the gum must bulge out somewhat at that point.

"The form presented by the gingivæ on the labial and buccal surfaces is a series of imperfect semicircles."—*Dr. Black.*

These curvatures are much flatter over the bicuspid and molars than over the front teeth, as Dr. Black's measurements have shown.

"The necks possess typical forms. At the cervix the gum is curved like a rounded triangle."—*Dr. Starr.*

Rugæ and Vault.

"Almost innumerable forms of rugæ may be noted on the roof of the mouth radiating from the median line toward both sides, stopping short of the gingivæ."—*Dr. Black.*

It is probably a fact that the variableness of the rugæ of the roof of the mouth is a feature peculiar to the human race.

Dr. C. C. Carroll thinks that "the rugæ have something to do with the resonance of sounds produced."

Dr. Harrison Allen published an article upon "The Palatal Rugæ in Man," in the DENTAL COSMOS of January, 1889, in which he undertakes to describe those folds which are more or less constant, and to show that the presence of hyperostosis of the maxillæ modifies the shapes of the rugæ, and that the variation and asymmetry of the folds are correlative with morbid phenomena, as the rugæ are modified by nutritive and developmental processes and by mechanical influences. Dr. Allen classifies the following features which appear regularly on the human palate:

1. The incisive pad is an elliptical or pear-shaped body, which answers to the position of the incisive foramen (anterior palatine canal or fossa), and is in line with the raphé.

2. The raphé is the seam-like line which occupies the middle of

the palate, and is ordinarily composed of two parts, one of which represents the median line, and the other is deflected from it to the left at the posterior free end. The raphé and incisive pad form the longitudinal rugæ.

"3. The transverse rugæ extend back no farther than the first molar, and are composed of papules which are arranged in series. The folds are smallest where the membranes are the thinnest, and are the largest where thickest.

"4. The largest transverse fold lies between the cuspids or first bicuspid, and answers to the suture between the maxilla and the premaxilla. It may receive the name 'sutural ruga.' The sutural ruga is the widest of any in the entire series: it is usually inclined somewhat backward, but never forward.

"5. The post-sutural space has four to seven rugæ, which are named in order from before backward. Of these folds the third is the best developed, the others being often aborted."

"The average height of the arch is .58 inch. The more intelligent the race, the higher the vault."—*Dr. Taibot.*

"The vault is highest at the space between the second bicuspid and first permanent molar."

"If the vault is high, the cranium will be high."

Whether this rule agrees with the facts is yet a question, and whether there be an index of mental or moral propensities outlined in the shape of the vault or of the rugæ has to be determined.

INTERARTICULATION.

Antagonism.

"Teeth antagonize when they strike only here and there, and prevent the other surfaces from touching."—*Dr. Davenport.*

This is an insufficient definition. It ought to be said, "Teeth antagonize when the lower jaw is carried laterally to one side, so that the teeth stand accurately vertical on each other and do not overlap. Both sides of the mouth can and do articulate simultaneously, but the antagonizing can only be done on one side at a time."

Articulation.

"The lobe of the ear is nearly intersected by an extension of the dental plane (of the upper arch)."—*Dr. C. T. Howard.*

The straight part of the line of occlusion (from centrals to second bicuspid), when extended posteriorly, will be found to touch not only the lobe of the ear, but also the base of the inferior surface of the cerebellum.

"The most common irregularity of the human teeth is defective inter-articulation."—*Dr. Dean.*

While this may be true, the constant use of the teeth might be expected to correct the bite to a considerable degree. Be this as it may, the consequences cannot be of much moment, for it is not the teeth that have to be ground, but the food, and when the arches run parallel and when the pressure falls mainly upon the back teeth, the effect of mastication must be satisfactory.

"Better articulations have always very square and firm teeth, with a close adaptation of the teeth opposed to each other."—*Dr. Dean.*

"Jaws set with massive, regular teeth strike squarely upon each other."—*Dr. Whitney.*

"In man the teeth occlude squarely, the one against the other."—*Dr. Ottolengui.*

"Every tooth of the upper jaw articulates with two of the lower."—*Dr. Parreidt.*

"The inferior central incisor is the only one that strikes against a single antagonist in occlusion."—*Dr. Starr.*

The upper wisdom-tooth has also but one antagonist !

"The grinding-surfaces have such perfect relation to each other as to permit contact throughout their extent."—*Dr. Davenport.*

"The grinding-surfaces of the bicuspid and molars have a typical shape, allowing them to meet with all their surfaces touching."—*Dr. Bonwill.*

"The upper central covers the central and about half of the lateral of the lower jaw, while the superior lateral covers the remaining half of the inferior and the mesial half of the cuspid."—*Dr. Harris.*

"The upper cuspid fits between the cusps of the lower canine and first bicuspid. The point of its cusp overlaps the lower teeth."—*Dr. Black.*

"The cusp of the lower canine is between the upper lateral and cuspid."—*Dr. Haskell.*

"The posterior side or slope of the lower bicuspid presses on the anterior side of the upper."—*Dr. Haskell.*

"The posterior edge of the inferior first bicuspid articulates with the anterior edge of the superior first bicuspid."—*Dr. Starr.*

"The buccal cusps of the upper back teeth articulate between the buccal cusps of the lower; they interdigitate, but the palatine cusps of each upper back tooth fit into the depression of each corresponding lower tooth.

"The lingual cusps do not shut into the spaces between the lower and drive them apart, but instead, the cusps strike into the depression of the next forward tooth, thus crossing over the space and binding the two lower teeth together."—*Dr. Davenport.*

This can be explained somewhat more precisely in the following way :

The mesial inner cusps of the upper molars strike into the depressions of the corresponding lower molars. The distal inner cusps of the upper molars strike into the space between the two lower molars. The mesial outer cusps of the lower molars strike into the space between the corresponding two upper teeth. The distal outer cusps of the lower molars strike into the depressions of the upper molars.

"The outer lower row of molar cusps works (rests!) between the two upper rows, and the inner upper row works (rests!) between the two lower rows."—*Dr. Davenport.*

"The lower buccal cusps rest in the upper fissures."—*Dr. Parreidt.*

"The lingual cusps of the upper bicuspid and molars fit with more or less accuracy into the general sulcus of the lower teeth.

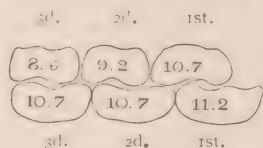
"The buccal cusps of the lower bicuspid and molars, in a similar way, are fitted into the sulcus of the uppers."—*Dr. Black.*

"The palatine cusps of the upper molars fall into depressions of the lower.

"The molars engage one another only in pairs (one to one); an upper molar interlocks only with its fellow of the same order in the lower jaw (although it slightly articulates with the adjoining lower molar too)."—*Dr. Dean.*

This statement is contrary to that of *Dr. Davenport*. The question arises, Who is right,—*Dr. Davenport*, who says each molar interlocks with two, or *Dr. Dean*, who means one molar interlocks with not more than one of the other jaw? *Dr. Harris* says in his textbook, "The first superior molar covers the distal two-thirds of the

inferior first and the anterior third of the second molar, while the remaining two-thirds of this last and anterior third of the lower wisdom-tooth are covered by the second upper molar. The wisdom-tooth of the superior maxilla covers the remaining two-thirds of the corresponding tooth in the lower jaw." This dictum is in favor of Dr. Davenport's view, which also seems to be the correct one when we have recourse to Dr. Black's measurements of the mesio-distal length of the teeth, and make a diagram according to his figures. We see there the right buccal side. The molars are repre-



sented in their real length (mesio-distal), which is stated in millimeters, and we can measure now with mathematical correctness that the third upper molar is only in contact with the third lower molar, of which 2.1 mm. are given to the upper second molar. This latter articulates, however, mainly with the lower second molar, of which it touches a surface of 7.1 mm. The remaining 3.6 mm. are given to the upper first molar, which covers with its remaining 7.1 mm. the larger part of the lower first molar,—4.1 mm. of which remain disengaged for articulation with the upper second bicuspid. This is the interarticulation of the molars when the wisdom-teeth do not overlap at the rear. Dr. Black informs us, however, that the upper third molars formerly extended over the distal end of the lower wisdom-teeth. If that is so, then the double antagonism of the molars would be even more extensive, and the second upper molar (coming farther backward) would not only get 2.1 mm. of the lower third molar, but perhaps 3 or 4 mm. And also the first upper molar would not only touch 3.6 mm. of the second lower, but perhaps 4.5 or 5.5 mm.

It seems to be proven by these arguments that the molars (except the upper wisdom-tooth) not only stand on one leg, but they stand on two legs, every molar interlocking with two other molars of the other jaw.

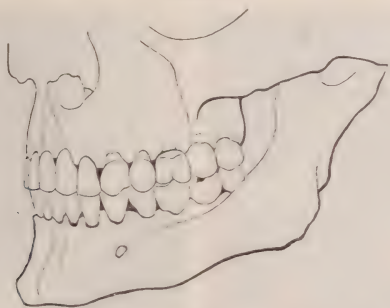
If we should stop our researches at this point, it would appear that Dr. Davenport's statements are the only correct ones, and that Dr. Dean, who assures us that the molars close only one to one, is decidedly mistaken. Guided, however, by the desire for actual truth, we must request the reader to follow some deeper investigations which will exhibit the fact that both articulations of the molars are a general occurrence, and that a regular denture looks just as natural, beautiful, and useful when the molars stand 1:1 as when they stand 1:2. Besides, it ought to be remembered that the divergence in question concerns only the extent to which the upper molars include the next distal lower molars in interarticulation, for Dr. Dean himself acknowledges that a *slight* inclusion does occur,—let us say as much as one-half or one millimeter, whereas Dr. Davenport, Dr. Black, and Dr. Harris consider three to four mm. as more nearly correct.

If, in the first instance, we compare the illustration which Dr. Black himself gives (in his book, "Descriptive Anatomy of the Human

Teeth," page 135) of an ideal denture with the illustration based on his own average measurements, we arrive at the striking discovery that the two dentures, the ideal and the average one, do not at all agree, and this gives us the healthy lesson that the measurements and statistics made by single private persons cannot serve as a standard, and that those figures which are supposed to represent an average of normality are in fact often only an undesirable pell-mell classification of degenerated and healthy individuals together. A normal average can only be obtained by studying normal, healthy people separately, without foreign admixtures. This is, again, an argument for statistical records of the armies of Europe. Dr. Black does not state in his book how many teeth he measured; he only remarks that his tables represent "the results of the measurement of many teeth"; but even had he measured a million or more, how little would that weigh when compared with a record of soldiers who are all of the same sex, same age, same health, and same nationality?

"No two teeth strike directly against each other," says Dr. Bonwill, whereby he means that none of the teeth of the upper arch articulates exclusively with one of the lower, but that it always includes a little

FIG. 6.



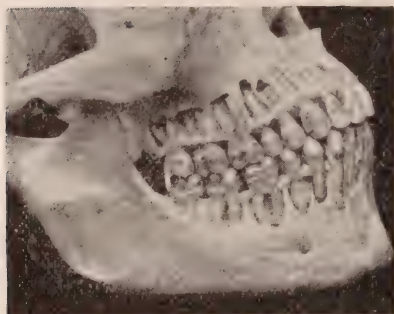
of the distal neighbor of its lower analogue; for instance, the upper second bicuspid includes in its interarticulation a portion of the distal neighbor of the lower second bicuspid (that is, of the lower first molar), and so on. But this rule does not in every case hold good for the molars,—at least not for the second and third molars,—as many regular dentures may be found where the upper molars hardly touch the distal neighbor of their lower analogue.

Illustrations could be drawn from nearly all authorities in dentistry showing the divergence of their ideas of the normal denture and the character of occlusion of the molars they think to be correct. Hence we can make the following rule:

The upper molar may either confine its occlusion to its fellow of the same order in the lower jaw, or it may be extended to the distal associate in the lower jaw to the extent of from one to five millimeters. For the first molar this extension (which means an occlusion with two molars in the lower jaw) is rather usual, but the second and third molars occlude, as a rule, only with their respective fellows.

As a good example of what notions even learned anatomists may have about the interarticulation of the teeth, the accompanying Fig. 6 may serve, taken from an older German anatomy. Here

FIG. 7.



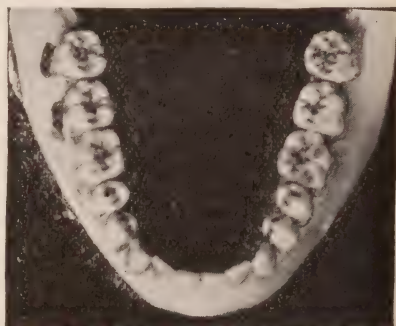
Side view from nature, showing normal occlusion.

FIG. 8.



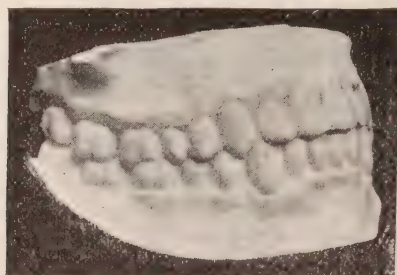
Same case, morsal surface, superior maxilla.

FIG. 9.



Same case, morsal surface, inferior maxilla.

FIG. 10.



Side view from a cast, showing normal occlusion.

the teeth stand one to one instead of interlocking with two occluding teeth, as would be correct. As we have seen, however, the bicuspid never stand on top of each other, but without exception they interdigitate,—that is, their cusps fall into depressions, and do not fall on the opposite cusps. So while the molars may more or less frequently occlude one to one, the bicuspid must articulate one to two, never one to one.

The dispute between Dr. Davenport and Dr. Dean is hereby settled; both are right and both are wrong. The other points of contention, however, remain open :

1. Does the length of the cusps govern the overbite?
2. Do all teeth stand perpendicularly, or slant outwardly, or does the lower jaw slant inwardly, or do single teeth only alternate in the slant?
3. Do all teeth slant mesially, or are the bicuspid excepted?
4. Is the plane of articulation flat, or curved, or double curved?
5. Does the average arch measure five inches, or what differences are presented in the various races and nations and sexes?
6. Are the human teeth designed for omnivorian or for frugivorian diet?
7. What is the exact cause or meaning of the color of teeth and gums?
8. Which of the bicuspid and which of the molars is the largest?
9. Is it better to represent the cuspid with a rounded or a pointed cusp?
10. What is the correct number of cusps for each tooth?

These are mooted questions yet, and it would be desirable for the profession at large to settle them, for the present article is only a weak effort in this direction. When these facts shall have been determined it will be possible to secure a typical model of the normal human denture for the use of students as a guide for study, and which will serve also as an ideally perfect specimen for suggestive use in the construction of artificial dentures.

Figs. 7 to 10 present views from nature showing several aspects of a denture which embraces nearly all of the points which should belong to an ideal normal denture, as noted in this paper.

As to the external contour of the mouth and face, ample opportunity is offered to every observer to study the correctness of the foregoing indications in the exhibitions of fine arts, especially in the work of the Greek sculptors, which throughout represent the universal norm of the human stature, which, showing ideal types of nature, will ever form the authoritative, unchangeable models for highest artistic beauty.

(To be continued.)

ON THE ACTION OF NITROUS OXID, AND OF THE MIXTURE OF NITROUS OXID AND OXYGEN.

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ANY reader of the last edition of my work on Therapeutics knows that I believe that nitrous oxid acts as an anesthetic by shutting off oxygen, and that this belief is founded upon the following facts: that,

as established by Jolyet and Blanche, and by Elihu Thompson, an animal will live in nitrogen, in hydrogen, or even in a vacuum, as long as in pure nitrous oxid; that, as shown by myself (*Therap. Gaz.*, 1890), the circulatory phenomena of nitrous-oxid anesthesia are very similar to those which are caused by the inhalation of pure nitrogen or by mechanical asphyxia; that, as shown by my own experiments as well as by those of the French observers above named, the addition of sufficient oxygen to nitrous oxid prevents any anesthesia; and finally that, as shown by the French observers, coma is not developed until the oxygen in the blood is reduced to three or four per cent. On the other hand, Paul Bert states that a mixture of eighty-five per cent. of nitrous oxid and fifteen per cent. of oxygen, under a pressure of at least two atmospheres, will produce anesthesia, and has devised an apparatus which it is stated has been used practically in Paris for the purposes of surgical anesthesia. Further, in the experiments of Jolyet and Blanche, and in my own experiments, never less than ten per cent. of oxygen was mixed with the nitrous oxid; and in some of the experiments the amount of oxygen in the mixture equaled that present in the atmosphere.

Under these circumstances, it has seemed to me well worth while to make a series of experiments to determine the effects of the addition of a small percentage of oxygen to the nitrous oxid inhaled, and to add to the main object of the research the investigation of the relations between the time required to produce anesthesia in an animal by the inhalation of nitrous oxid and that necessary for the production of anesthesia in the same animal by complete exclusion of air; or in other words, by mechanical asphyxia. In these experiments a tracheal canula was first tightly tied in the trachea of the dog, then connected with a rubber tube, which in turn could be either connected with a graduated gasometer, or be completely stopped up by means of a tightly driven cork. By the use of mercurial valves the inspired and expired air were entirely separated, so that the animal never re-breathed the gas mixture.

I have made five experiments, in which pure nitrous oxid was first breathed, then after a sufficient lapse of time nitrous oxid containing three per cent. of oxygen, then nitrous oxid containing five per cent. of oxygen, and then mechanical asphyxia was produced. In each case two or more inhalations of the pure or oxygenated nitrous oxid were given; and in reporting below the results of the experiments, the average time of the several inhalations in each case is given. The test for the completion of anesthesia was the complete abolition of all conjunctival reflexes. As in the dog these reflexes are very persistent, it is probable that loss of consciousness and sensation were reached a little before the time noted; but the corneal reflex affords the best practical test for comparative judgment, and I therefore employed it. The following are the records of the five experiments made:

EXPERIMENT I.—SMALL DOG.

Pure Nitrous Oxid.

Min.	Sec.	Remarks.
0		Inhalation began.
2	30	Corneal reflexes gone to light touch.
3		Reflexes gone entirely.

Min.	Sec.	Remarks.
0		Inhalation began.
2	35	Corneal reflex gone to light touch.
3	45	Reflex gone entirely.

Nitrous Oxid with Three Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
4	45	Corneal reflex gone.
0		Inhalation began.
4		Corneal reflex impaired.
4	30	Reflexes gone.

Nitrous Oxid with Five Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
6		Reflexes unchanged.
0		Inhalation began.
12		Reflexes not impaired.

Mechanical Asphyxia.

Min.	Sec.	Remarks.
0		Cork put in tracheal tube, so as to prevent any entrance of air into the lungs.
2	15	Corneal reflex gone.

EXPERIMENT II.

Pure Nitrous Oxid.

Min.	Sec.	Remarks.
0		Inhalation began.
2	10	Corneal reflexes gone.

Nitrous Oxid with Three Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
2	30	Corneal reflexes impaired.
4	30	Corneal reflexes very feeble, but not gone; respiration almost arrested.
5	30	Corneal reflexes gone.

Nitrous Oxid with Five Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
9		Corneal reflexes impaired.
11		Corneal reflexes much impaired.
12	30	Corneal reflexes same.
14		Corneal reflexes almost gone.
15	30	Corneal reflexes gone; respiration regular and good. Half a minute after detaching apparatus, corneal reflex had become about normal.

Mechanical Asphyxia.

Min.	Sec.	Remarks.
0		Cork put in tracheal tube.
2	30	Corneal reflex gone.

EXPERIMENT III.

Pure Nitrous Oxid.

Min.	Sec.	Remarks.
0		Inhalation began.
2	20	Corneal reflex gone.

Pure Nitrous Oxid.

Min.	Sec.	Remarks.
0		Inhalation began.
2	10	Corneal reflexes gone.

Nitrous Oxid with Three Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
2	30	Corneal reflexes impaired.
4	30	Corneal reflexes very feeble but not gone; respiration almost arrested.
5	30	Corneal reflexes gone.

Nitrous Oxid with Five Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
9		Corneal reflexes impaired.
11		Corneal reflexes much impaired.
12	30	Corneal reflexes same.
14		Corneal reflexes almost gone.
15	30	Corneal reflexes gone; respiration regular and good. Half a minute after detaching apparatus, corneal reflex had become about normal.

Mechanical Asphyxia.

Min.	Sec.	Remarks.
0		Cork put in tracheal tube.
2	30	Corneal reflex gone.

EXPERIMENT IV.

Pure Nitrous Oxid.

Min.	Sec.	Remarks.
0		Inhalation began.
1	30	Corneal reflex gone.

Nitrous Oxid with Three Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
3		Corneal reflexes gone.

Nitrous Oxid with Five Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
6		Corneal reflexes much impaired.
10		Corneal reflexes almost gone.
19		Corneal reflexes gone.

Mechanical Asphyxia.

Min.	Sec.	Remarks.
0		Cork put in tube.
1	50	Corneal reflexes gone.

EXPERIMENT V.

Pure Nitrous Oxid.

Min.	Sec.	Remarks.
0		Inhalation began.
1	45	Corneal reflexes gone.

Nitrous Oxid with Three Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
2	50	Corneal reflexes gone.

Nitrous Oxid with Five Per Cent. of Oxygen.

Min.	Sec.	Remarks.
0		Inhalation began.
23		Corneal reflexes gone.

Mechanical Asphyxia.

Min.	Sec.	Remarks.
0		Cork put in tube.
1	40	Corneal reflexes gone.

The following table gives the results obtained in these experiments. Where one or more inhalations of the same character were made in the single experiment, the average of the respective times required to cause complete anesthesia is given in the table.

TIME REQUIRED FOR ANESTHESIA.

Exp. No.	Pure Nitrous Oxid.		Nitrous Oxid with 3 Per Cent. Oxygen.		Nitrous Oxid with 5 Per Cent. Oxygen.		Mechanical Asphyxia.	
	Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.
1	3	27	4	37			2	15
2	2	10	5	30	15	30	2	30
3	2	15	5	30	15	30	2	30
4	1	30	3		19		1	50
5	1	45	2	50	23		1	40

In taking the average of the five experiments, it will be noted that two minutes thirteen seconds was required to produce complete anesthesia with pure nitrous-oxid gas, while in mechanical asphyxia the same result was reached in two minutes nine seconds. The correspondence between these two periods is very close,—so close indeed as to give the very strongest evidence of the truth of the theory that nitrous-oxid anesthesia is really a form of asphyxia. As the carbonic acid in the blood in mechanical asphyxia must count for something, it is remarkable that the nitrous-oxid period was only four seconds longer than that of the asphyxia.

The effect of the introduction of a little oxygen into the nitrous oxid was very pronounced: three per cent. of oxygen caused the average time required for the production of anesthesia to lengthen from two minutes and thirteen seconds to four minutes and seventeen seconds, while the introduction of five per cent. of oxygen increased the period to eighteen minutes and fifteen seconds. This effect of oxygen is, of course, a very strong corroboration of the asphyxia theory.

After the completion of the five experiments, I made one trial of the effect of the inhalation of a mixture of nitrous oxid with eight per cent. of oxygen. The inhalation was continued during half an hour, at the end of which time the corneal reflexes, although impaired, were still quite active. The supply of gas giving out, my experiment was ended, but certainly it was continued long enough to decide that eight per cent. of oxygen will in the dog indefinitely postpone the production of complete anesthesia. That the system is affected, however, was shown by the fact that mechanical stoppage of the tube at the end of the half-hour produced very few struggles, complete insensibility occurring in less than a minute.

The results which I have reached in this paper indicate that theoretically it is possible to get a mixture of oxygen and nitrous oxid which will contain sufficient oxygen to maintain for a length of time the vital function, and yet have so little oxygen that consciousness would be lost. The zone, however, between unaccompanied loss of upper brain function and loss of respiratory and heart power is such a narrow one that it does not seem to me probable that the surgeon can avail himself practically of the existence of this zone: the danger of passing suddenly from anesthesia into sensibility, or from partial into complete asphyxia, would always be too imminent. Another difficulty would lie in the great length of time required to produce anesthesia with a combination of oxygen and nitrous oxid. It is not possible by experiments upon the lower animals to determine accurately the exact percentage of oxygen which the surgeon should mix with his nitrous oxid when essaying to make use of the zone just above spoken of. My experiments seem to show that in the dog six per cent. of oxygen in the nitrous oxid is probably the nearest approach to a practical anesthetic mixture that can be made. It is probable that in man a larger proportion of oxygen could be used, as I was rather surprised to find the powerful effect upon myself of two or three deep inhalations of nitrous oxid containing five per cent. of oxygen.

The conclusions which seem to be reached by the present research are, first, confirmation of the view that nitrous oxid produces anesthesia by cutting off the supply of oxygen; second, that a mixture of nitrous oxid with oxygen does not seem to be available as a practical anesthetic.

THE QUESTION OF LOCAL ANESTHETIC NOSTRUMS.

BY EDWARD C. KIRK, D.D.S., PHILADELPHIA, PA.

(Read before the First District Dental Society, State of New York, March 14, 1893.)

THE discovery of the local anesthetic properties of cocain, the active principle of the *Erythroxylon coca*, has among other things resulted in the production of a crop of nostrums, which are advertised

and put upon the market for specific use by injection into the gum-tissue to render the operation of tooth-extraction painless.

It is noteworthy that this method of producing local anesthesia was not practiced—in fact, was unknown—until after the discovery of the anesthetic properties of cocain and its salts. Since then, however, the number of nostrums offered to the dental profession for this purpose has rapidly increased, until at present their name is legion, and they continue to multiply, seemingly in a geometrical ratio, each and all claiming to be the "best," "safest," and altogether "most satisfactory,"—and apparently the end is not yet. Such a multiplicity of preparations, each recommended as efficient and reliable, none lacking in numbers of enthusiastic advocates, whose laudatory testimonials are appended to the advertising circulars accompanying the preparations, would appear to indicate a widespread use of these nostrums by dental practitioners. Private letters of inquiry constantly received by your essayist also tend to confirm this view, so that the question of the status of this class of preparations and the attitude of the dental profession toward their use is one that seems to need definition,—to which end I shall ask your consideration of the results of an investigation which I have undertaken with regard to this question, in the hope that it may lead to some well-defined action on your part with reference to the attitude of this society, if not the whole profession, respecting these preparations.

For the sake of clearness, let us discuss the question under two divisions: First, that of nostrums in general; and second, this class of nostrums in particular. It is well to distinguish at the outset the difference between a patented medicine formula and one the composition and ingredients of which are kept secret. The term *nostrum* has been used to designate both, but Webster restricts it to secret formulæ. The term *arcanum* is used by Dunglison to describe secret formulæ especially, and this word is defined as "any recipe or preparation reputed to possess great efficacy, whose composition is kept secret."

The distinction between patented formulæ and those which are kept secret is of importance, inasmuch as the patenting of a formula is in some degree equivalent to making its composition public, as the records of these patented formulæ are accessible to all who care to investigate them. The formulæ of secret preparations, on the contrary, are the sole property of the proprietors or their agents.

A certain number of dental practitioners, forming an organized body and having in mind the conservation of the best interests of the profession, have formulated certain rules for their guidance, which rules are known as the Code of Ethics, and adherence to these is made the measure of reputability which in their view distinguishes those practitioners who are animated by right motives toward their professional brethren from those who are not so animated. The ethical principle upon which the code rests is that which animates all communities whose moral growth has progressed to a point when it is possible for their members to conceive the maxim, "Do unto others as ye would that they should do unto you," and live up to it. That the evolution of this maxim in a community does actually represent a higher and better status of society is perfectly demonstrable objectively; therefore we are warranted in asserting that those who are animated by this principle represent the better element in any society, the dental profession included.

With respect to the use of nostrums, the Code of Ethics of the American Dental Association, in Article II, section 3, under head of "Maintaining Professional Character," says, "It is unprofessional to circulate or recommend nostrums, or to perform any other similar acts," which means that the moral sense of the better element in dentistry is against the use of these preparations. In his annual address in 1892, the president of the Pennsylvania State Dental Society, at its Cresson meeting, expressed his views upon the subject as follows: "If we are professional at all, it is entirely inconsistent with the pretension, that any one should secure control of procedures or the use of appliances for his own exclusive benefit, and unworthy those who are under the moral obligation to fulfill the maxim, 'Freely as ye have received, freely give.' The endeavor to impose upon the profession by dispensing, for gain, secret formulae of any of the preparations or materials we use is a still more reprehensible practice, and the use of such should be excluded from any and every society. To effectually stamp out this evil there appears only one means of action, which is for each practitioner to refuse to use any preparation the ingrency and the proportions of which are unknown to him."

During the ensuing discussion of the address, Dr. J. Allen Osmun said, "There is no discovery or improvement in the practice of dentistry that would benefit the profession or their patients that the dentist who possesses it is not under bounden obligation to give to the profession. He owes it to them."

Under the title, "The Right and the Wrong of It," the *Philadelphia Medical News*, December 24, 1892, quotes the following from the *American Lancet*: "The *Practitioners' Monthly* says, 'It is not wrong to use a proprietary medicine because the code says so or because some men think so. It is wrong because it damages both medicine and pharmacy. It is wrong because it retards progress, sacrifices the good of the mass for the profit of the individual. The code or men's thoughts are of value only as they represent facts.' " And again, the *Journal of the American Medical Association*, October 8, 1892, prints the following under the title, "The Falsity of Nostrum Dealing": "The *Positive Medicator* of June has formulated the following conclusions as the result of a very full knowledge of the ways and means of the patent-medicine vendors:

- "1. They claim to be specifics, which they are not.
- "2. The consumer pays an excessive price for a secret preparation when, were its formula known, the same preparation could be prepared and sold by his druggist at a reasonable figure.
- "3. Simple remedies are clouded in secrecy, and sold as valuable new discoveries, which they are not.
- "4. Nostrums interfere with legitimate pharmacy, and being sold by dry-goods bazaars, rob the pharmacist of his right alone to compound simple remedies for simple ailments.
- "5. Their selling value depends not upon their merit, but entirely upon their being pushed by advertising, which advertising in the end the consumer has to pay for.
- "6. There is no question but that the manner of advertising many nostrums is injurious to the public good. Ignorant people with slight illnesses are made to believe that they are in dangerous conditions, and frightened into buying and consuming stuff which may not at all

be suited to their cases, and which they use at an excessive cost to their pocket-books and general health," and then adds: "From the above statement it will be seen that it is practically impossible for the nostrum-maker to say a true word in any of his published statements. One ingenious calculator has figured out the cost of production of a dollar bottle of advertised medicine, and he has found that the utmost of drug-value that the manufacturer can afford to deliver to the sick person is ten cents. In other words, ninety cents out of the dollar paid by the consumer are necessarily absorbed by the proprietor, the wholesale druggist, the local dealer, and the newspapers and other channels of spreading the lying claims of the nostrum, before the deluded patient receives his dime's worth of noxious liquid. And doubtless it is better for the patient that he gets that small return for his dollar; the less he gets for his money the better off he will be."

Sufficient has perhaps been said to place before you a reasonably clear presentation of the reasons why the ethical sense of both medical and dental practitioners of the better class is antagonistic to the use of nostrums in general.

Let us now examine the question with respect to the special class of nostrums advertised for the painless extraction of teeth, whose proprietors are flooding the country with laudatory circulars, each one claiming to be the best; new ones appearing in such rapid succession that they seem to "breed like wolves in a famine-stricken land."

The fact that this class of preparations has made its appearance *since* the discovery of the local anesthetic properties of cocain and its salts, and the close resemblance to cocain anesthesia of the anesthetic action of all of these nostrums which I have examined, led me to suspect that they depended on cocain in each instance for their activity, if they really had any,—especially as until quite recently no other drug was known to possess the obtunding property in anything like the kind or degree belonging to cocain. I therefore obtained samples of ten of the various preparations most extensively known and advertised as local anesthetics for painless extraction of teeth, taking especial care in each instance to secure original unbroken packages from the manufacturer or his agent. These I had analyzed by the professor of chemistry at the Philadelphia College of Pharmacy, Professor Samuel P. Sadtler, Ph.D., a chemist of large reputation and experience, and of unquestioned ability, especially in this field of work. His communication of results is as follows:

PHILADELPHIA, February 2, 1893.

DR. E. C. KIRK:

Dear Sir.—In December last, I received a package containing samples of so-called "local anesthetics," with a request that I give them a careful chemical analysis, particularly noting the percentage of cocain salt which might be present.

The list of designations of these ten samples, with a description of their appearance, is as follows:

1. *Dickson's Improved Anesthetic*. For painless extraction of teeth. From the Dickson Manufacturing Company, Sharon, Pa. Colorless liquid, with odor of carbolic acid.
2. *Arophenic*. A local anesthetic for the painless extraction of teeth. From the Arophenic Manufacturing Company, Kingsville, Ohio. Colorless liquid, with odor of rose and also of carbolic acid.
3. *Jessop's Local Anesthetic*. B. J. Pressley, D.D.S., Hammonton, N. J. Colorless liquid, with slight odor of carbolic acid.

4. *Dorsenia, the Brazilian Local Anesthetic.* Discovered by C. A. Young. From the Dr. C. A. Young Anesthetic Company, Boston, Mass. Colorless liquid, with distinct odor of camphor.

5. *Dr. G. Weinmann's Local Anesthetic.* Brownish-yellow liquid, with odor of creasote or carbolic acid.

6. *Odontunder.* Local anesthetic for the painless extraction of teeth. Manufactured by the Odontunder Manufacturing Company, Fredonia, N. Y. Colorless liquid, with odor of rose.

7. *Dental Surprise.* Manufactured by the Slocum Manufacturing Company, Holly, Mich. Colorless liquid, with carbolic-acid odor.

8. *Dr. E. T. Barr's Local Anesthetic.* For the painless extraction of teeth. Manufactured by E. T. Barr, dentist, Bowling Green, Ky. Nearly colorless liquid, with odor of peppermint and cloves.

9. *Eureka Anesthetic.* S. R. Osmun, Morristown, N. J. Colorless liquid, with slight carbolic odor.

10. *Anæsthesio-Obtundent No. 2.* W. Irving Thayer, D.D.S., Williamsburg, Mass. Slightly yellowish liquid; odor of camphor and mixture of essential oils.

All of these were given a careful qualitative examination, and then the total non-volatile matter was determined. Chlorin determinations were next made from which the anhydrous cocain hydrochlorate could be calculated. The pure alkaloid cocain was then extracted with chloroform, the difference between this figure and that obtained from the chlorin determination indicating decomposition products due to the use of commercial cocain salts. The results are summarized in tabular form (see table).

I remain, yours very truly, SAMUEL P. SADTLER.

ANALYSES OF LOCAL ANESTHETICS.

	Non-volatile Matter.	Anhydrous Cocain Hydrochlorate from Chlorin Determinations.	Alkaloid Extracted by Chloroform.	Other Constituents.
1. Dickson's.....	4.06	3.90	3.27	Carbolic acid, chloral hydrate.
2. Arophone.....	12.92 (Liquid.)	1.46	1.05	Carbolic acid, chloral, glycerin, oil of rose, and probably alcohol.
3. Jessop's.....	3.82	2.63	1.22	Carbolic acid, oil of rose.
4. Dorsenia.....	0.30	0.20	0.145	Carbolic acid, camphor, and probably alcohol.
5. Weinmann's.....	5.46	5.68	3.72	Alcohol, oil of peppermint, brown color, and iodine (indicating aristol possibly).
6. Odontunder.....	10.14 (Liquid.)	1.35	1.10	Carbolic acid, glycerin, oil of rose, and probably alcohol.
7. Dental Surprise.....	1.37	1.46	1.16	Carbolic acid.
8. Barr's.....	0.06	none.	none.	Alcohol solution of oils of peppermint and cloves.
9. Eureka.....	3.36	3.26	1.37	Carbolic acid and oil of rose.
10. Anæsthesio-Obtundent	Liquid)	3.39	2.61	Carbolic acid, camphor, glycerin, oils of cinnamon and citronella, and probably alcohol.

It will be seen from this report that all of the preparations examined, with the exception of Barr's, were found to contain cocain. This exhibit becomes interesting from the fact that in some cases the proprietors either explicitly deny that their preparation contains cocain, or so word their statements as to warrant that inference. In support of this, I quote as follows from a pamphlet entitled "Dorsenia," published by "The Dr. Young Anesthetic Company":

"To those who are unfamiliar with this remarkable drug we would say that while it is a most reliable local anesthetic, acting immediately with lasting anesthetic properties, its composition is *absolutely void* of cocaine, chloral, arsenic, opium, or any poisonous drugs. Thus it may be used on all classes of patients with entire safety."

"The use of Dorsenia in dental surgery has met with such universal success that the medical profession, one by one, are adopting its use in minor surgery as a substitute for cocaine and freezing. Dorsenia has so many advantages over cocaine that it at once commends itself to the surgeon."

In the same pamphlet, under the heading, "The Disadvantages of Cocaine, Gas, and Other Vapors, Ether and Chloroform," it says,—

"Cocaine—Action uncertain; must wait ten to fifteen minutes for desired effect; anesthesia rarely complete. In the majority of cases, after-effects, serious toxic symptoms. Many deaths have been reported."

In the same pamphlet, under the title, "The Advantages of Dorsenia," it states that

"It may be used on all classes of patients, the young, the old, the sick, and the healthy, and for the extraction of every tooth in the jaw at one sitting, without danger. No after-effects."

And further:

"The value of Dorsenia has been demonstrated before such societies as the First District Dental Society of New York, the Union Convention of Dentists in Boston, Mass., the Dominion Dental Society, Montreal, Canada, etc."

The analysis shows this preparation to contain at least 0.20 per cent. of cocain hydrochlorate.

In a circular issued by the Arophone Manufacturing Company, Kingsville, Ohio, occur the following statements:

"Dentists who value their practice and reputation should beware of the many cocaine preparations now being put upon the market. If you use them, trouble may come when you least think, and ruin your business. Use Arophone and be on the safe side."

"The dental profession has already learned much of the new remedy aristol, which is being so thoroughly discussed in all leading dental and medical journals of the day. This remedy enters largely into the composition of Arophone, which alone should be a guarantee that it is the latest as well as the safest and best local anesthetic on the market."

The analysis shows entire absence of aristol.

"Arophone will positively destroy all sense of pain, and cause no after-trouble. It is applied to the gums, so that there is no more need of inhaling poisonous drugs, such as chloroform, ether, gas, etc., thereby risking one's life, or at best impairing their health. It can be used on any one, even those suffering with heart-disease, lung-trouble, or nervous debility, whether young or old."

"You are aware that the market is flooded with so-called local anesthetics. Many of these are only imitations of Arophone, trying to follow in our footsteps only to fall far short of their desires. Do not be deceived. Do not trifle with those cheap cocaine preparations, for when you least expect it, you may ruin your practice and your professional standing."

"No antidote is necessary when using Arophone, more than a swallow of cold water, or dilute alcohol or other stimulants, and fresh air. Be pleasing, and make your patient feel cordial and pleasant as possible. Apply Arophone to the gums by means of cotton, then insert the point of a fine hypodermic needle in the tissue surrounding the teeth to be extracted, at an angle, going deeper as the gums turn white, using alike on each side of teeth. Wait about two minutes and extract, going down low enough to assure the teeth not to break. Have no fear in using Arophone. It is the safest anesthetic ever used."

The foregoing suggestions for the relief of unpleasant symptoms are those which, as you are aware, are used in cocain-poisoning, and the analysis shows the presence of 1.46 per cent. of cocain.

In the circular of "Directions for the Use of Thayer's Anæsthetic-Obtundent" occurs the following statement :

"The proprietor wishes it distinctly understood that his Anæsthetic-Obtundents are not death-producing compounds, hence the benumbing qualities are recommended for *five minutes* only. They will act sharply for that time; the anesthesia commences in ten seconds on soft tissues, and increases, which is not the case with cocaine."

The analysis of this preparation shows 3.39 per cent. cocain hydrochlorate.

In the circular published by the Dickson Manufacturing Company, Sharon, Pa., entitled "Special Directions for Dickson's Improved Anesthetic," it states,—

"Occasionally a patient may complain of faint feeling or slight sickness at stomach; to relieve this, give twenty drops of aromatic spirits of ammonia in a little water."

A very good antidote to poisoning by cocain, of which there is 3.90 per cent. in the preparation.

Viewed from the standpoint of a knowledge of their composition, the claims of the proprietors of these nostrums, as set forth in their respective circulars, make interesting reading, with which you are all no doubt quite familiar, but enough has been here quoted to show at least one phase of its character.

The question then arises, Is the use of cocain or its salts in the manner and for the purposes set forth a legitimate procedure under conditions where the operator is not aware of the fact that he is using cocain? Let us see what the status of the admitted and recognized action of cocain is at present, and whether it is regarded as a uniformly safe drug to use, even with a full knowledge of the rationale of its physiological action and the consequent command of the situation which such a knowledge entails, whereby any untoward action of the drug which threatens life may be promptly and intelligently combated.

The deaths which have occurred from cocain administration are quite numerous; current medical and dental literature for the past few years has contained frequent reports of such fatalities. Moreover, the dosage under which fatal casualties have occurred has varied to such an extent that no fixed limit can be positively placed for a maximum safe dose of this drug. It has been shown conclusively that one is quite likely to frequently meet temperamental idiosyncrasies in individual cases, where even minute doses of cocain may produce the most alarming symptoms. In support of this, I quote the following communication from Dr. Mattison, medical

director of the Brooklyn Home for Habitues, published in the *Philadelphia Times and Register*, October 15, 1892. The article is in reply to a statement in a previous issue by the editor of that journal, Dr. W. F. Waugh, respecting syncope following the local use of cocain in two patients, of whom he says, "They were persons who could be expected to faint on any suitable occasion, and my impression is that this is true in all, or nearly all, reported cases."

Dr. Mattison, however, thinks differently; he says,—

"In three papers by myself.—'Cocain Dosage and Cocain Addiction,' *London Lancet*, May 23, 1887; 'Cocain Toxiæmia,' *La Tribune Médical*, Paris, January 1, 1888; and 'Cocain Poisoning,' *Medical and Surgical Reporter*, October 24, 1891,—more than two hundred cases of poisoning by cocain, including thirteen deaths, are reported. In a fourth paper—soon to appear—more deaths and other toxic cases are cited, making a record that medical men should ever have in mind when using this valued but dangerous—sometimes—drug.

"I think your 'impression' that 'all, or nearly all, the reported cases were persons who could be expected to faint on any suitable occasion,' a mistaken one. It will never do to presume that a patient who, by virtue of robust build, is not likely to faint, will be proof against the untoward effect of cocain, for he who puts such an opinion in practice will run large risk of 'coming to grief.'

"Many of the patients noted in my papers were not subject to syncope, and in the latest reported fatal case in this country.—a recent occurrence in Bellevue Hospital.—a strong, healthy man, who was given a four per cent. solution by urethral injection, died in less than four minutes!

"It may not be amiss to repeat the conclusions of my studies in cocain-toxiæmia:

- "1. Cocain may be toxic.
- "2. This effect is not rare.
- "3. There is a lethal dose of cocain.
- "4. This dose is uncertain.
- "5. Dangerous or deadly results may follow doses usually deemed safe.
- "6. Toxic effects may be the sequence of doses large or small, in patients young or old, the feeble or the strong.
- "7. The danger, near and remote, is greatest when given under the skin.
- "8. Cardiac or renal weakness increases the risk.
- "9. Purity of drug will not exempt from ill result.
- "10. Caution is needful under all conditions.
- "11. Reclus's method, Corning's device, or Esmarch's bandage should be used when injecting.
- "12. Nitrite of amyl, hypodermic morphin, hypodermic ether, alcohol, ammonia, and caffen should be at command."

In a paper read at the tenth annual meeting of the American Rhinological Association, at Indianapolis, September 22, 1892, on "The Uses and Abuses of Cocain," Dr. Arthur G. Hobbs, of Atlanta, Ga., says,—

"Since I received my first twenty grains of the hydrochlorate of cocain (a part of the first two-drachm package that arrived in New York), I have used many ounces; perhaps, altogether, by myself

and assistants, almost as many pounds as my original package contained grains.

"It will not be amiss for me to say, in the beginning, that I now have very different opinions of its uses from those I entertained during the first years of its advent.

"The general symptoms are, everything else being equal, much oftener present in proportion to the area of membrane surface involved than in proportion to the strength of the solution applied. Hence, sprays of a weak solution are liable to produce toxic symptoms, when much stronger solutions can be applied with a saturated cotton probe or wad, to a limited area, almost with impunity.

"The constitutional effects of cocain are manifested by a feeling of faintness,—it may be even to the loss of consciousness,—a trembling of the limbs, a pallor of the face, any or all of which may appear in one minute or in fifteen minutes after the application to a large surface. Again, these symptoms may be produced by a small quantity of a one per cent. solution in one individual and not in another; even if in the latter both the strength and quantity be ten times multiplied. I have never reached a conclusion as to the average amount of cocain that is necessary to produce the constitutional symptoms; neither do I ever know, the first time I use it, how to estimate the individual's susceptibilities.

"Every individual seems to be a law unto himself as to the quantity necessary in his own case to accomplish complete local anesthesia; and even in the same person the amount will vary at different times, with no apparent cause. Under similar circumstances I find it impossible to reach a complete local anesthesia in some, short of the toxic symptoms; when in others one-tenth of the amount and one-tenth of the time will render the application of a galvanocautery absolutely painless."

We have now shown by the record of analyses that the nostrums so far examined, with a single exception (Barr's), depend for their action upon the cocain they contain, and we have adduced expert medical testimony to show that the introduction of cocain into the circulation is under certain circumstances attended with grave danger to life; furthermore, that the conditions under which cocain may be safely introduced into the circulation are not well known, or only incompletely made out. It requires no further argument to support the assertion that the use of a drug which is known to be possessed of dangerous activities becomes culpable when its identity is disguised in the form of a nostrum, leaving the administrator absolutely handicapped by reason of his ignorance of the nature of the preparation and of the rational restorative treatment which should be applied in case of threatened danger to the life of his patient. His only resource in such event would be to treat the case on general principles, or rely on the meager directions furnished by the quack who compounded the nostrum.

The treatment of cocain syncope is a sufficiently grave and difficult matter when its causation is perfectly known, but when it occurs from cocain *incognito* it is a combat in the dark, with the chances mostly in favor of the enemy.

From the ethical standpoint, the use of this class of preparations appears to be wrong, not only for the general reason that the use of

all nostrums is wrong, but in addition because they may become a menace to life. From a purely commercial standpoint the traffic in these preparations is, to put it mildly, unjust.

The present market price of cocain hydrochlorate is about five dollars per ounce, wholesale. A four per cent. solution is therefore worth twenty cents per ounce. The record of analyses of the nine preparations which I have presented to you this evening show amounts of cocain varying from .20 to 5.68 per cent., which makes an average of 2.59 per cent., representing an actual average value of (in round numbers) thirteen cents for each ounce of the nostrum, and this is sold to the dental practitioner at an average price of one dollar and fifty cents per ounce.

I have left out of the computation the other ingredients, as they are of such slight value as to have no material effect upon the cost. In the single preparation here reported which contains no cocain, the compound consists of one ounce of alcohol containing a few drops each of oil of peppermint and oil of cloves, and this preparation, having an actual drug value of less than five cents, is sold at the retail price of one dollar per ounce. It is probably physiologically harmless, and is therefore not to be included in the special ethical considerations applicable to those preparations containing cocain. It is simply a fair example of the usual type of quack nostrums, in which the consumer pays an exorbitant price for a trifling drug value.

My object in bringing these data before you has been to call your attention not only to what I regard as a breach of the spirit of our Code of Ethics, but a condition of affairs which seems to me to constitute a real danger to the dental profession and the community at large, and it is in the spirit of this belief that I commend these statements to your consideration.

SOME COMMENTS UPON "THE HERBST METHOD OF TREATING PULPS."

BY WILLIAM E. CHRISTENSEN, D.D.S., PHILADELPHIA, PA.

UNDER the name of "the Herbst method of treating pulps," a mode of treatment new to most dentists in this country has come over to us from Germany. It depends upon devitalizing and amputating the crown portion of the dental pulp and capping the root parts, and was first presented to representatives of dental science in this country by Dr. C. F. W. Bödecker at the annual meeting of the New York State Dental Society, May 12, 1892, where it was met in very much the same spirit as was the question, "Can there any good thing come out of Nazareth?" Yet the skepticism which arose in regard to the system may seem not altogether without reason, though many of the objections sound as if they had their origin simply in surprise or in loyalty to the old customs.

Dr. Bödecker presented the question scientifically, as would naturally be expected from him, and his great care and pains shown in the presentation and "advocating" of this system is to be very much

commended. Still, the question has a practical as well as a scientific importance, and it seems to me if Dr. Bödecker's and Professor Heitzmann's astonishing scientific assertions have not failed to help the question to attract more attention, they have at least aroused a great deal more incredulity than I believe would have followed if the method had been presented more from the point of view of its immense practical value.

Dr. Herbst, I believe, has never practiced his method with any other purpose than that of preserving teeth with as little pain and trouble to his patients and himself as possible, and though I am absolutely without doubt about his success in this treatment, and though I have practiced his method myself now for more than four years, I could not help feeling astonished and doubtful as I read some of Dr. Bödecker's statements in the October DENTAL COSMOS. It was therefore with curiosity that I thereafter watched for what would follow, and in Dr. Harlan's paper, published in the March DENTAL COSMOS, his objections and skepticism toward the question were about what I expected would come. However, this writer, as well as the part-takers in the discussions, all seem to direct their attention toward Dr. Bödecker's assertion of having found "living tissue" even in the crown part of teeth treated after the Herbst method, or to the miraculous effect and "self-limiting" properties of the "cobalt," looking entirely away from the point which the originator himself declares to be the chief cause of his positive success in preserving the teeth, the proof of which does not rest on "two specimens," but on the endless number of cases successfully treated during more than eight years' busy practice.

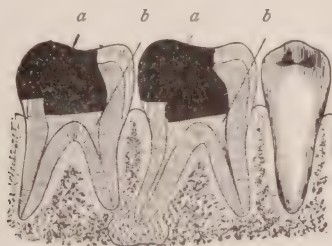
Apart from the standpoint of Dr. Bödecker's scientific explanation and statement of extreme results, I will try to forward the question and to come more nearly to the spirit of the originator of the method by giving some plain explanations of plain facts, the originator, Dr. Herbst, being a busy and rather matter-of-fact man, who I think does not care much for paper-writing nor for presenting any scientific dissertation or theory.

The first point to which I would like to call attention is, that there is not as much originality in the whole procedure as may appear. The idea of amputating the crown portion of the pulp by cutting it smoothly off with sharp round burs or spoon-shaped excavators, and allowing the root portions to remain untouched in the roots, was first introduced by Dr. Adolph Witzel, in Essen, who commenced experimenting in this direction in 1872, and in 1874, at the meeting of the "Central Association of German Dentists," in Cassel, was able to report upon more than one hundred and eighty successful cases. In his two most beautifully illustrated books, "The Antiseptic Treatment of Diseases of the Dental Pulp," Berlin, 1879, and "Compendium of the Pathology and Therapeutics of Diseases of the Dental Pulp," Hagen, 1886, this author describes his methods and theories most clearly and intelligibly; and I suppose, if not in this country, thousands of dentists in Europe practiced his course of treatment long before the Herbst method was heard of. Witzel, after a twenty-four-hour application of arsenious acid, amputates the crown portion of the pulp in the manner already mentioned. He recommends cleanliness and disinfection above all, and fills the pulp-chamber with

strong antiseptic paste,* prepared in such a way as to remain soft, over which he places a loose platinum cap, and then the filling. The action of the strong antiseptics, he says, makes the remnants of the pulp shrink and remain as dry antiseptic bodies, "a far better filling-material for the roots than the purest gold."

This treatment we may call simple and, at the same time, scientific. I do not think it has many partisans in this country, and yet I believe, like Witzel, that these perfect gold or tin root-fillings of the American systems are most frequently done only in imagination or in the writers' papers, and happily so; but even where they are done, I believe they serve the purpose badly. The labor and almost impossibility of filling molar roots with gold or tin is known well enough, but even when the pulp is removed entirely and the root filled with any antiseptic material, I believe much after-trouble is unconsciously caused by introducing septic matter into the root-canals, breaking off points of nerve-extractors, irritating the pericementum in one way or another, or not filling the canals entirely, so that vacuoles remain filled with air, etc.

FIG. 1.



a, a, amalgam; b, b, gutta-percha.

I had a most illustrative case in my practice not long ago: A gentleman, twenty-six years of age, strong and healthy constitution, came to me with intense pain in the left lower jaw. He said a dentist in this city had, then five months ago, devitalized the pulps and filled the cavities in the first and second left lower molars, of which the filling in the second molar had come out again. As the pain, however, was not caused by this tooth, but by the first molar, I removed the filling from that tooth also, and found that of these four root-canals only the one in the distal root of the first molar, which of course was the easiest one to reach, had been drilled out and filled with gutta-percha down to the apical foramen, and under this root there was now an acute inflammation. Fig. 1 shows the conditions present. Evidently the labor and trouble this dentist had given himself and his patient had only been the cause of an abscess. The three other roots were chiefly filled with secondary dentine.

I have another case in my practice at present, where a lady of about twenty-three has had three upper molars filled at different times by three different dentists, and with every one of them pericementitis appeared five months or less after the "nerves had been

* R—Hydrarg. bichlorid. corr., 2 grm.;

Acid. phenyl., morph. muriat., 1.5 grm.

Misce exactiss, terende adde ol. menth. pip., ol. caryophyll., ana gtt. i.

S.—Morph.-sublimat-phenol paste.

killed." I found every one of them filled as far as possible up in the roots with gutta-percha. Every dentist with any practice will have met numerous similar cases. I think I need not enter into any further defence of pulp-amputation, but it will be seen that this manipulation is neither new nor was it originated by Dr. Herbst.

Yet the point in "the Herbst method" against which all voices seem to arise especially is that of applying cobalt as a devitalizing agent instead of arsenious acid. This opposition, I believe, has been caused chiefly by the wrong understanding that cobalt was applied for the purpose of saving the vitality of the pulp in the roots. Cobalt, on the contrary, was applied for the very same purpose as arsenious acid would be. The reason why Dr. Herbst and many other dentists commenced using cobalt was solely this: that it is less acute and more slow, yet absolutely sure in its action. In my preceptor's office we used to apply powdered cobalt ore on a piece of cotton soaked in a dilute solution of morphia and phenol for devitalizing exposed pulps in children's teeth, and also in the teeth of adults when the patient could not come the following day for further treatment. We always left it in the tooth at least forty-eight hours, and we did not mind allowing it to remain even a whole week, and it never caused pericemental irritation, as is so frequently seen when arsenious acid is applied longer than twenty-four hours.

Many dentists have used cobalt in this or similar ways since long ago. Dr. Northrop says that "Dr. Crane used it entirely in the place of arsenic," and Gorgas's "Dental Medicine" says, "The late Dr. Robert Arthur preferred cobalt as a devitalizing agent to arsenious acid, being of the opinion that less irritation followed its action, and consequently greater immunity from periosteal inflammation." Hence, when Dr. Herbst commences his procedure in applying cobalt for devitalizing the pulp, I fail to see the originality in it as well as in the amputation of the pulp, but I do not fail to see the purpose in doing it.

Now, the term "cobalt" seems to have brought up a confusion and to have acted the part of a "Kobold" among our professional men, like the ore did among the German miners when it was first discovered. From the inaccuracy of all, or rather of the little that has been written and said so far about this remedy, I conclude that all who used it till now, like myself, used neither chemically pure cobalt, cobalt oxid, nor any salt of cobalt, but simply the cobalt ore as it is found and sold in every drug-store under the name of cobalt.

I think Dr. Herbst or Dr. Bödecker should have examined the exact nature of this remedy before bringing it before the profession. Dr. Kirk, in the March DENTAL COSMOS, gives us an analysis of "the cobalt of Herbst" which rather increases the confusion. I am very free to accept his statement that "whatever of value it may have is due to the effect of arsenic," as I have always believed this to be so; but I infer from Dr. Kirk's statement that not all of the cobalt ores contain arsenic, though I have not been able to obtain any free from this element. Again, I should be very much surprised if any druggist, on a request for cobalt, would give out "pure metallic arsenic," which is a substance very few druggists keep in stock. If, therefore, the "cobalt" which, by Dr. Kirk's analysis, was found to be "pure metallic arsenic," came from Dr. Herbst, Herbst must

have changed his course of treatment. I do not think he has done so, but I think that if we hereafter, instead of the term "cobalt," should say "cobalt ore," and apply such as contains "from thirty-three to thirty-five per cent." of metallic arsenic, there would be much less possibility of further confusion, and we would also obtain a clear understanding of its already proved effects.

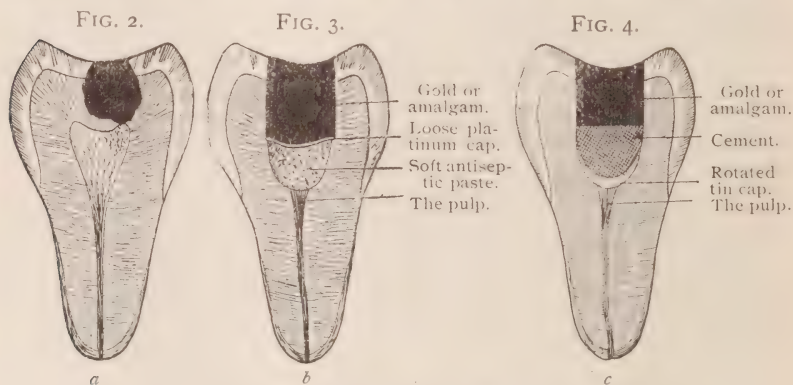
As the action of the cobalt ore is a devitalizing one like that of arsenious acid, I think it very possible that the effect of the first is chiefly due to the presence of arsenic, but when certain differences in the action of cobalt and arsenious acid have been noticed, why should not these differences be due to the different states in which it is present? We have on the one side A_2O_3 , anhydrous arsenious acid, applied in the state of fine powder or in some kind of solution with hydrogen as arsenious acid; and on the other side the far more insoluble metallic arsenic, one-third bound to two-thirds of another metallic element, the action of which on the exposed pulp is not yet known. In this state it is applied finely powdered, and we have with the latter a slow and limited action, whereas with the first an acute and farther going action takes place. I think the cause *might* lie in the difference of solubility of the two substances and relative proportions of the substances to the capillarity of the pulp. A few preliminary experiments which I have recently made on teeth of dogs seem to point definitely in this direction. However, I do not care at this date to assert this belief absolutely concerning what should be ascertained only after a full study of a large number of positive results; but having already commenced a series of experiments in this direction, I hope shortly to be able to publish some new developments.

One part of the method I should give but little attention to,—viz, that of applying cocain in connection with the cobalt ore. It is a matter of course that no dentist would apply any devitalizing agent to the exposed pulp without adding some local anesthetic remedy to diminish the sensitiveness of the pulp due to the caustic action. Morphia and essential oils have been used most extensively. In connection with the cobalt ore, I have used solutions of morphia and phenol, sometimes cocain in twenty per cent. solution, sometimes the powdered cocain hydrochlorate, together with the cobalt ore, and I always have had the very same effect. Dr. Herbst says he takes but eight per cent. of cocain to ninety-two parts of cobalt. I always take twenty per cent. of cocain to eighty per cent. of cobalt ore, and I should think this proportion only could produce a painless action; however, the eight per cent. may be enough.

As cocain has a paralyzing effect on the nerves, and it often has caused long lasting paralysis when injected hypodermically, I think where so strong a dose is applied directly to the exposed nerves and capillaries of the pulp there is some possibility that where the root portions of the pulp remain alive after the amputation and capping, their diminished sensibility may partly be due to the effect of the cocain.

When Herbst first began practicing his method of gold filling by rotation, it was with the same intention of saving himself and his patients trouble, pain, and time, considering the mallet method exceedingly rude, which I am sure is the opinion also held by every patient. This method, however, has not become universal, perhaps because it has never been really understood. The mallet method—

rude as it may be—is plain and reliable. I have seen Dr. Herbst practice his rotation method, and admired his skill and ease in working, as well as the beauty of the work, and in my desire to do it like him I have tried hard, but there is a point upon which I cannot gather full confidence: that of the adherence of a single gold pellet to a surface which has just been made entirely smooth by the burnisher; yet Dr. Bonwill uses smooth points in his mallet, and if this can be done, I should rather prefer the Herbst method. But there is one fact which I believe has been universally accepted ever since this method was introduced: that no higher degree of contact can be obtained than when foil of a soft metal is burnished against the walls of a cavity. When Herbst in his new method fills the pulp-chamber with tin and burnishes it against the walls, he certainly obtains an air-tight closure over the root-pulps, under which mummification may well take place, but no process of fermentation and decay will be possible. It is at this point that we find Herbst's originality, and it is on this point that Dr. Herbst rests his theory and declares his success. Dr. Bödecker tells us how Herbst first came to practice



The same tooth (a) filled by Witzel (b) and by Herbst (c).

in this direction, by burnishing caps of gold foil over exposed pulps and afterward finding the pulp-chambers of such teeth "empty and without the slightest perceptible odor." When I visited Dr. Herbst in Bremen, two and a half years ago, he told me the very same thing, and he said, "I even believe the remnants of the pulp sometimes remain alive!" Here I believe we have the whole truth at once. Dr. Herbst, as I already said, and his method is a logical consequence, did not commence practicing his method with the special intention of saving the vitality of the remnant of the pulp, but with only the object in view of saving the tooth. The pulp-residue may in some cases remain alive, as has been shown by Dr. Bödecker, and it may even be more often the case than I myself was and very many others are liable to believe, but the great success of the Herbst treatment is, that whether the pulp remains alive or not the tooth is saved and preserved more easily and better than by any other method.

As long as I worked exclusively after the Witzel method, failures sometimes occurred; I should say three to four per cent. These cases, however, were chiefly sixth-year molars, and most frequently

with very young and chlorotic girls. We all know that the pulps in these teeth, especially in youth, are more voluminous and rich in protoplasm than those of adults, hence more difficult to protect from putrefaction, and I should prefer always to remove such pulps entirely and fill the roots with strong antiseptic paste. When, therefore, Dr. Bödecker recommends the profession to practice and experiment with the Herbst method only on these teeth, such a course would be to put it through a fiery ordeal. More satisfaction, I believe, will be obtained if older teeth are also taken into consideration.

I worked for some years in Munich as only assistant in the office of Dr. L. A. Weil, a man of prominent scientific standing, where I sometimes treated more than twenty patients in one day. Naturally, in so busy a practice, a time- and pain-saving system was preferred; however, it was not adopted only for this reason. The Witzel method produced few failures, yet the Herbst gave less; in fact, in four years I have not met a single one. I have avoided such cases as are excepted above, and have practiced the Herbst method only with application of rubber-dam and antiseptics, in teeth where I was able to get a perfect view of the cavity, so as to be sure of perfect work, and I do not know of a single failure. If Herbst himself has some, I believe it to be the consequence of working without the rubber-dam and too weak antiseptics; but as far as I understand, Dr. Herbst does not recommend practicing in this way. He merely says, "Even then there will be but few failures." These are the simple facts and positive results of the system in which Dr. Herbst has combined his own originality with already invented valuable procedures, and I should not, like Dr. Rhein, think it "very premature" to bring a matter to the knowledge and consideration of the American profession which has already had extensive use abroad, and there at least is no longer looked upon as something new, besides being a matter of eminent importance and value to every dentist and every patient. The American dental profession has till now maintained the highest professional standing, but this is no reason for raising a "Chinese wall" around it and closing the gates against what comes from the outside. Dr. Bödecker's assertion that the entire tooth remains alive, which he is accused of resting upon the microscopical examination of only "two specimens," may be disposed of one way or another. The Herbst course of treatment will all the same be "a great success and one of the most valuable procedures ever discovered in dentistry."

CROWN- AND BRIDGE-WORK AS A MEANS OF REGULATION, COMBINED WITH RESTORATION.

BY GEORGE W. WARREN, D.D.S., PHILADELPHIA, PA.

(Prepared for the C. N. Peirce Society, Pennsylvania College of Dental Surgery.)

It is the phase of dentistry known as bridge-work which marks the greatest advancement made during the past quarter of a century, and at the same time has been, and is, I regret to say, greatly abused. It is in the construction of this class of dentures that unusual mechanical skill is required, and professional judgment needed for determining where they are admissible. "Evolution has played a successful

part in this, as in all things that have the germ of progress in them." It was but a few years ago that the majority of our best dentists were hostile to this class of work ; but this feeling has gradually decreased, until now almost every intelligent, observing dentist regards this branch of dental practice as of the greatest importance ; and we find many cases, where the work has been thoroughly performed, that commend to the highest degree this means of restoration.

In this response to a request for some personal experience in crown- and bridge-work, I will describe three cases which have been of more than usual interest.

A patient, about forty years of age, an actress by profession, presented herself for an examination of her teeth, which were found in a

FIG. 1.



FIG. 2.



deplorable condition. The six superior front teeth were very irregular, and in otherwise bad condition ; the two lateral incisors and one of the centrals were devitalized, while the other central and the cuspids were badly broken down by caries. In the lower jaw the second bicuspid and the first molar were missing on either side, the second molars had tipped forward considerably, and the third molars had never erupted ; this, with the protrusion in the superior teeth, allowed the inferior front teeth to close up so as to nearly or quite touch the soft tissue of the palate just posterior to the superior incisors. The patient was very anxious to have something done that would improve her articulation, give her a better masticating surface, and improve the general appearance of the mouth for her work. I therefore decided to excise the superior front teeth from cuspid to cuspid, and put on Richmond crowns, using smaller teeth, so as to bring them

into line and correct the irregularity. But before doing this a bridge was made for either side of the lower jaw, using teeth a little longer than her own, in order to open the bite and relieve the pressure at the palatine surface of the superior incisors. The result has been very gratifying, both to the patient and myself. An idea of the improvement made in the lady's appearance may be had by comparing Figs. 1 and 2.

The second patient was a lady some years younger. Her mouth presented as bad or even a worse appearance than the one just treated. Here an opposite condition of affairs was found in the anterior part of the mouth; that is, the lower jaw protruded, and when the mouth was closed the inferior incisors and cuspids closed over

FIG. 3.

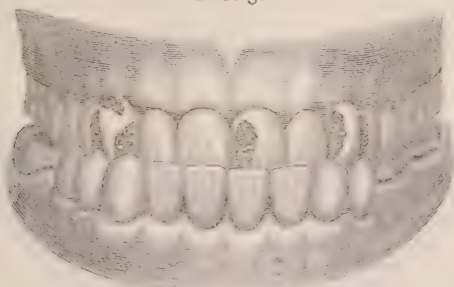
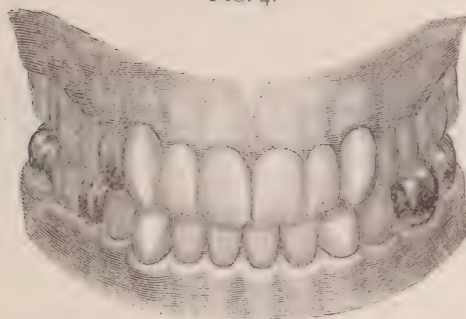


FIG. 4.



the superior teeth, so as to nearly hide them from view. On the right side of the lower jaw the first and second molars were missing, and the third molar had tipped forward so much as to be of little use in mastication. On the left side the first molar was missing, but the roots of the second and third molars were in place and in a fairly good condition. A bridge was inserted upon the right, and gold crowns upon the roots of the left side. These were all made of sufficient length to open the bite to a considerable degree, then the long, irregular cutting-edges of the lower incisors and cuspids were ground off by means of a stone and polished. Upon the superior incisor roots the patient was wearing an antiquated form of crown, which was removed, and the crowns of the cuspids and first bicuspid on the left were excised, and Richmond crowns placed upon the roots. The first bicuspid on the right side was a vital tooth, and was covered

with a gold crown. The six front crowns were made a little shorter than the teeth the patient had been wearing, and they were inclined forward, so as to correct the occlusion and appearance to such an extent as to have them close upon the edges of the corresponding lower teeth. The change is shown by the accompanying illustrations, Figs. 3 and 4.

The third and last case is that of a young lady of twenty-two years. When she called upon me, her mouth presented a very homely appearance, which was due entirely to the ignorance or lack of judgment upon the part of her dentist in earlier years. The history of her case can be given in a few words. It is a characteristic of her family to have large, strong teeth, with the cuspids quite prominent; but in her mouth these teeth were so prominent as to disfigure her, and when she commenced to grow into womanhood, her mother took her to their dentist to have the irregularity corrected. This gentleman, as I have said, through bad judgment extracted the two lateral

FIG. 5.



FIG. 6.



incisors, and allowed the cuspids to come down and forward to partially take their place. Then the mischief was done. The mouth was given a very coarse appearance by the large teeth being brought so near the center, and as they did not entirely fill the space, an ugly opening was left between these teeth and the central incisors. (See Fig. 5.) When the lady consulted me, it was with the idea of having these cuspids extracted, and two smaller teeth inserted upon either side; it was her wish at the same time to have it done, if possible, in some way so that she would not have to wear a plate. I therefore, after studying her case, decided not to extract the cuspids, but those which should have been removed in the first place,—the first bicuspids. Then with suitable regulating appliances I corrected the angle of the cuspids and drew them back so as to partially fill the space formerly occupied by the first bicuspids, and at the same time drew the second bicuspid in line, and secured them all by a retaining appli-

ance, which was worn for several weeks. A lateral incisor was then prepared for either side, and inserted by means of plate and pin bridges, as described by Professor Litch in the "American System of Dentistry." The result obtained was exceedingly gratifying, and the patient called again to express her pleasure before leaving the city. Fig. 6 will give a fair idea of the appearance of the mouth when the work was completed.

I have not entered into the details as to the method of constructing crowns and bridges, as you have received such instructions in the lecture-room and clinics, but have selected these cases from my notebook to give you additional demonstration of the possibilities of esthetic and prosthetic dentistry.

THE IODOFORM QUESTION.

BY J. FOSTER FLAGG, D.D.S., PHILADELPHIA, PA.

IN the DENTAL COSMOS of February, 1893, will be found—page 87—an article by Professor Miller, of Berlin, under the title of this communication, the value of which from a purely scientific standpoint may be recognized, but which, it seems to me, should be seriously questioned from both the historic and practical points of view.

It commences with the doubt as to whether any other remedy is so unsatisfactorily "placed," either as regards the theory of its action or as to a proper estimate upon its value, as is iodoform, and proceeds to give Germany and Austria most prominent positions in the early work for this purpose, and leaves the reader with the decided impression that experiments "from a dental point of view" were needed even at this late date.

It seems to me that all this is erroneous, and, as the "conclusions" are *precisely* those which I had arrived at from several years of clinical experimentation prior to the suggestions of Schneider, Scheff, Tautzer, Skogsborg, Witzel, and Schmidt, all of which, so far as *iodoform* was concerned, were at that time proven fallacious, it cannot be right to permit any such misleading communication to stand unquestioned.

For fully *eighteen years* the teachings at the Philadelphia Dental College regarding iodoform have been :

1. That *usually* it was of no value as a disinfectant or as an antiseptic, therefore useless in putrid conditions of root-canals.
2. That it was *usually* valueless, either alone or as an adjunct to other materials for filling canals.
3. That in the conservative treatment of pulps it was *usually* of no value.
4. That as an adjunct to arsenical paste for any purpose, and especially for that of lessening the pain of the application, it was *usually* of no value.

5. That as an application for treatment of periodontitis, and for alveolar abscess either without or with fistula, it was *usually* valueless.

All these definite conclusions had been reached as the results of long and varied clinical work, both in private practice and in the

college clinic, and experience during all these years seems to have given us a solidly "proper estimate" as to the *usual want of value of iodoform as a dental medicament.*

These conclusions, it appears, have been fully *corroborated* by the "agar-agar" testings of Professor Miller.

But now we have considerations which are of great value as warnings against much possible harm, and also as directors toward much possible good, and which any amount of "agar-agar" work would *never* in the least indicate or even intimate.

These are the facts, as thoroughly proven clinically as have been all the others: that iodoform may be, idiosyncratically, an *irritant* of less or more decided violence, *the removal of which is all-sufficient to entirely dispel every unpleasant symptom,* and equally, that iodoform *may be* the medicament which, after all ordinary and usual applications have consecutively and signally failed, will give the desired relief from pain or will produce prompt and enduring cessation of inflammatory and purulent conditions.

That these possibilities are accepted will be recognized by reference to Inglis's "Questions and Answers" upon dental pathology and therapeutics, where it will be noted that no compound for arsenical paste is given as containing iodoform until the *last but one*, and that one the *adjunctive* compound of cocain and menthol, and that the iodoform is evidently conjoined to the arsenic for some attribute which *it alone may be* capable of giving.

Further, that iodoform paste, made simply from iodoform and fluid cosmoline, deodorized by oil of cinnamon,—which does this perfectly and persistently, as demonstrated by the specimens in the college cabinet of from few to *many years* of compounding,—is stated to be "used as last resort in pulp-soothing or capping, or in canals."

Why as a "last resort"? Because it has *so long been known* to be *usually* valueless,—possibly irritating, but also (when everything else has failed) as possibly almost marvelously beneficial.

Under these circumstances it seems *somewhat late* for science, with its "agar-agar" work, to presume to tell us now that which we in America have known for so long a time, and *leave untold* facts which it is so important, for our patients and for ourselves, that we should know.

IS IT POSSIBLE TO GET A PERFECT IMPRESSION OF ANY MOUTH?

BY T. DWIGHT INGERSOLL, ERIE, PA.

BUT little is really known regarding perfection in the vegetable and animal kingdoms. If nature has always been constant in her failure to attain perfection, we may regard the taking of a *perfect* impression as an impossibility, yet it should be our constant effort to solve the question as nearly as possible.

There are a great number of artificial dentures that are comparatively useful and comfortable, but a greater number are very imperfect. This does not seem very strange on the supposition that only a few of the great number of dental college graduates make many well-fitting plates during the first year of practice.

If a few hints that are here suggested will aid the first-year practi-

tioner in improving his work, the writer will be compensated for his labor:

The first-year graduate will learn after a time that his impression-material has not always been of a proper consistence, or that it was not introduced at a time when it was in the very best condition, nor was the length and breadth and depth of the tray quite adapted to the form of the jaw. A little too much time may have elapsed in passing the lips and adjusting the plaster to the jaw, and by that time the "setting" of the plaster has begun; or, if the pressure of the tray has not been properly directed, or if the direction has been changed, an imperfect impression will be the result. After the plaster begins to "set" it will not flow perhaps in the desired direction, and it may be forced away from some part of the jaw where it is needed. If too much material has been used, it may cause the patient to struggle for relief, making another trial necessary.

After an impression of the upper jaw has been obtained, the groove that represents the ridge of the jaw may be scraped to a depth of about the thickness of two leaves of the DENTAL COSMOS, thinning away from the lowest part of the groove up toward the arch, and up the inside of the flanges toward the cheeks. If the arch is high and broad, two or three thicknesses of varnish may be put on in a line one-fourth of an inch in breadth, where the rear part of the plate is to rest. The surface from that belt of varnish toward the front may also be varnished broad enough to cover the suction-cavity, also along the median line toward the front, contracting the breadth of the varnish to a point near the upper lip. The thickness of the varnish is designed to compensate for contraction of a high-arched plate.

A model taken from such an impression may need a little scraping along the sides of the arch between the suction-cavity and the groove made by the alveolar ridge, scraping as far toward the front as the rugæ, making it the deepest near the rear edge of the plate. By this means the plate is prevented in some measure from being drawn away from the lingual sides of the jaw by shrinkage of the rubber. The experiment as above suggested should not be undertaken without the greatest care, for it is a rather hazardous one; it is recommended only for those mouths having wide jaws and a high palate. The model of a broad, flat mouth would not be thus treated. But if no change is made in the form of the model, as suggested, and if the back part of the plate does not quite reach the hard palate, the vulcanite may be softened by a spirit lamp and burnished up to the roof. Should the edge of the plate be thus made to press too hard against the mucous membrane, relief may be had by reheating and downward pressure.

Much difficulty is sometimes met with in getting a good impression of the lower jaw in the mouths of some old people. The alveolar ridge has perhaps nearly disappeared, and folds of the cheek lie upon the alveolar line; the muscles of the tongue move up and down with every movement of that organ. In such cases I have been very successful in getting good impressions by the use of a wire bow of suitable size and bent into just such form as will best prevent the cheeks and lower lip from covering the jaw. The accompanying figure is of the exact size and shape of one that was used a few days ago in the mouth of an old lady. The sides of the bow are bent

downward a little to correspond with the curvature of the jaw. (See illustration.) The use of the bow causes no particular unpleasantness, and it prevents an interference of the soft parts of the mouth with the impression-material, being entirely outside of the space designed for the tray.

The first thing after the impression is obtained is to scrape the inner sides of the flanges,—those portions next to the cheeks; but if the flanges are not high and nearly horizontal, I would not alter them. The bottom of the groove made by the ridge of the jaw may also be scraped a trifle. After the model is obtained, to compensate further for contraction of the vulcanite, which causes the ends of the plate to approach each other a little, the lingual sides of the model may be shaved or scraped, beginning where the ends of the plate are supposed to press against the inner side of the jaw, decreasing in depth



toward the front arch until the place for the cuspids is reached, or a little farther if a V-shaped model is used. Success in this respect depends much upon how and where the model is altered, and upon the exercise of philosophical judgment by the artist.

Another way to increase the distance between the ends of the plate after it leaves the flask is to cut a thin piece of pine wood a few inches in length, making one end slightly tapering and just broad enough to fill the space between the ends of the plate. The front part of the denture may be softened in hot water, and the tapered end of the stick may then be pushed forward toward the front teeth one-eighth of an inch, or just far enough to separate the ends of the plate about one-twentieth of an inch, and the stick should be held in that position until the vulcanite is cold.

ELEMENTS OF SUCCESS.

BY C. N. JOHNSON, L.D.S., D.D.S.

(Read before the Chicago Dental Club, January 23, 1893.)

SUCCESS is not always what the world believes it to be. In all ages the counterfeit of success has too often been mistaken for the genuine article. Men have risen to renown, have levied homage, have swayed masses, have wielded scepters, have waved the mailed hand over serried ranks and files of their fellow-men, and have for these things been called successful. The elements which enter into the consummation of a truly successful life should be measured by other standards than those manifest in outward form and ceremony. A king may sit upon a gilded throne and not be a successful man.

The individual who is the most successful is the one who does the greatest good, and the one who does the greatest good is the one who spreads the most happiness.

He who evolves from his brain an idea which results in a benefit to the human race, and who himself shares in that benefit, is a successful man. So far as we are able to judge, Watt was successful. So was Stephenson, even though he declined a knighthood. The man who guides a nation or a people through a crisis, and leads them triumphant into a better condition, and who then sees the realization of his endeavors and partakes of the results, is a successful man. George Washington was successful. The man who champions a just cause, who labors for the liberation of his fellow-man from either physical or mental bondage, and who lives to see the reform established, is successful. Abraham Lincoln, great, tender, loving soul, was a successful man, for while his end was tragic, he saw the consummation of his hopes. Lincoln, before he heard the report of the assassin's weapon, had the blessed privilege of listening to the rattle of chains falling from the legs and arms of his fellow-man. The man who by his breadth of brain discovers a new principle of life, who adds a link to the ever-lengthening chain of science, and who sees the world grow grander under the spell of his genius, is a successful man. Charles Darwin was successful. He who brightens the life of millions by the magic touch of his pen, and who hears the heart-beats of humanity echoing to the rhythm of his own mind, is successful. Oliver Wendell Holmes, Harriet Beecher Stowe, Charles Dickens, George Eliot, Nathaniel Hawthorne, and all the poets from Burns to Bryant may be numbered among those whose success has been peculiar to their calling.

These names are all great, but it is not necessary to be great to be successful. A man may be humble and happy; he may be renowned and wretched.

Passing to the lowlier walks of life, a man's success is measured by the amount of happiness he gets himself and gives to others in his immediate circle. He may not sway the destinies of a nation, but he probably controls the happiness of some one. To be successful he must employ his talents in the direction which insures beneficent results corresponding in full to his ability. The mechanic who labors six days in the week and has one on which to rest; who masters his work and does it so expertly and faithfully that his employer cannot

afford, and does not desire, to do without him ; who earns enough to give himself and family all of the necessities and a few of the luxuries, and who does not acquire a taste for things beyond his means ; who is honor-bright with everybody, devoted to his wife and children, loyal to his friends, charitable with his enemies, and whose face is always missed when absent,—this man is successful. He is at least far happier than the average potentate or millionaire.

Success in any pursuit depends upon certain conditions, and the requirements often differ with different pursuits ; but there is one condition of all others which in every phase of life is more essential to true success than any other. No matter what qualifications a man may possess entitling him to the promise of success, if he has not within him the elements of absolute honesty of purpose, he may not hope to be successful. It is acknowledged that this statement seems directly opposed to the general experience and example of the age. Men who appear to be the most successful are often men devoid of that fine quality which rigidly distinguishes between right and wrong. An article in the *Century Magazine* a few years ago pointed out the fact that the men who seem to get on best in the world, who prosper most in power, place, and purse, are men who ignore the nice discrimination represented by the figure of Justice with the balance, and who take advantage of every quirk and quibble of law and usage up to the very point where the law becomes prohibitive. The man who manipulates stocks to the disadvantage of the small stockholder, and who reaps a reward for his own pocket, does so within the limit of the law, and the money thus made buys him a place in society. It gives him power, and it does not apparently reflect upon his reputation in the community. In fact, it rather seems to elevate him in the estimate of the world. People say that he is a little smarter than other men, and in saying it they appear to convey a compliment. The professional man who skims along on the borderland between professional outlawry and professional etiquette, but who keeps inside the latter limit far enough to avoid actual disgrace among his fellows, is often permitted to gain an apparent ascendancy over men who are steadfastly true to principle. And yet with these examples, with the apparent artificiality of the age and the evident winking at breaches of the moral code on every hand, the fact remains that to be essentially and permanently successful is to be essentially and perpetually honest. The fact that people give a man credit for being smarter than other men does not imply that they retain respect for him. It more often implies that they are inwardly suspicious of him.

We may leave out of consideration entirely the moral aspect of the question, and forget for the time the high sense of duty which obligates each individual to every other individual. We may ignore completely the teachings of the golden rule and argue the matter from a purely utilitarian standpoint, and still the argument holds good. The truth is that down to the most literal interpretation of a common adage, "Honesty is the best policy." An advantage gained by questionable methods is at best a temporary one, and any advantage which carries with it a sacrifice of self-respect or the respect of others cannot be called success.

A fact often lost sight of by men who hedge along on the shady side of honesty is that the world sooner or later estimates a man at

his true worth. Many a man has gone on for years in a community fondly believing that his motives were a sealed volume to the people about him, when in fact the people were perfectly aware of his every impulse. There is no other one characteristic of an individual about which the world is so sure a judge as that which relates to his honesty of purpose. It may be mistaken about his ability,—in truth it often is,—it may give him credit for being a genius when he is simply an ass, but it seldom errs in the matter of his sincerity. It may not tell him of his defects, but it knows that he has them.

This at least seems to be true of our own profession, for no matter how brilliant a dentist may be in professional attainment, he cannot long conceal from his fellows any dishonest propensity that may mar his character. The first element of true success in dentistry, then, as in other callings, is honesty.

Taking this as a general fundamental requirement, we may perhaps profitably turn our attention to some of the minor requisites, and consider a few of the elements which go to make a successful dentist.

In the first place, a man must have the ability to do good work, and the conscience to persistently apply that ability. It is true that some practitioners who are lacking in ability manage to keep up a patronage for a time through the medium of a smooth tongue and a ready wit to excuse a failure, but sooner or later their sins will find them out and their patronage fail. Not only does a man lose patronage through poor work, but with a loss of patronage goes a loss of self-confidence, and a loss of self-confidence leads directly to a loss of self-respect. A man who has no faith in himself is not on the road to success. It should be the aim of every dentist, young or old, to perfect himself in every way possible for the proper performance of his work. If he discovers a lack in himself at any point, he should not rest till he has made good the defect. Some men acquire proficiency much easier than others, and dentistry is a rather exacting calling in this regard; but it is safe to say that there are few men practicing dentistry to-day who cannot, if they lay their whole energy to the task, gain a sufficient mastery over the details of their work to entitle them to a fair measure of success in practice. It is oftener undeveloped ability than lack of ability that is accountable for much of the incompetency we see in our ranks. If every dentist would covenant with himself to make an unceasing struggle for the very highest attainment within his power, he would not only go far toward securing his own success, but he would help to elevate immeasurably the profession of which he is a member. The future of dentistry would be brighter by far if every man connected with it were permeated with a proper progressive spirit.

Another element of success is the faculty of understanding human nature in its various phases as we come in contact with it. There is no other profession, unless it be that of medicine, where equal tact is required in controlling and pleasing the different manifestations of temperament going to make up that medley mass called humanity. In order to be successful with a patient the dentist must win his confidence, and the only way to do this is to thoroughly understand the individual. One person is impressed and pleased by a dignity and reserve which would instantly repel another. A child is influenced in a different manner from an adult, and should call for a different

demeanor,—this with the one reservation that some adults never get over being children. One person naturally expects a jest and a laugh, while probably the next patient who takes the chair resents anything short of a glum silence and an intense concentration on the work in hand. It may be laid down as a safe procedure to avoid the too prevalent tendency of attempting to give oneself the reputation of a wit among one's patients by saying smart things when the patient is in the chair. Ordinarily the patient much prefers a quick and skillful operation to a string of pale jokes hung at half-mast. It may be appropriate to say something bright or cheery—something of a diverting nature—at the proper time and in the proper manner, but flippancy of any kind should be avoided. Especially is there one subject about which it is hazardous to venture into the realm of rail-lery, and that is the subject of fees. If a patient is encouraged by the dentist into a pleasant banter about his bill, he is likely to think that the dentist has taken advantage of it when the bill is rendered. This is a matter of too great importance to the dentist to admit of any jesting, and the hackneyed though significant statement is true that "business is business."

When it is intimated that the dentist should study the temperament of each patient, and accommodate himself thereto, it is not meant that he should sink his own individuality in that of his patron. The very contrary is true. It is probably one of the greatest elements of ultimate success for a man to cultivate a distinct individuality, and impress it indelibly upon all of his surroundings. To be commonplace is to invite mediocrity. The successful dentist will formulate methods peculiarly his own, and he will insist on his patients subscribing to those methods. When a practitioner allows himself to become the slave of his patrons, when he obeys every caprice or whim, when he nods obeisance to every beck or call of a thoughtless intruder, he not only loses caste among his patients, but he disorganizes the business feature of his practice to the end that material accomplishment is impossible. People respect a man who has individual ideas and methods, provided those methods are obviously based on good judgment as to what is best for patient and practitioner.

Above all things, a perfect system should be established and observed in following out the routine of each day's work. More can be accomplished in a given time and with a less expenditure of energy by perfectly systematizing the work than one would imagine who conducts his practice in a slipshod manner. There are too many men in the profession who are taxing their mental and physical resources with meager results on account of lack of system. The advantageous utilization of every moment is of vast importance, both to operator and patient. This matter is not often carefully enough considered in its relation to the duty one owes one's patient in saving his time. With individuals whose patronage is desirable time is usually an important element, and a willful waste of a patient's time is inexcusable, and justly results sooner or later in a loss of patronage. An operation should always be made as short as possible, consistent with good work. Common humanity, outside of any other consideration, should argue in favor of this idea, for in the aggregate there is less suffering and inconvenience where the work is done expeditiously and with precision.

Another important element of success pertains to the practitioner's personality. To be successful, a man must be a gentleman; and to be a gentleman, a man must know how. It would sometimes seem, in this age of push and hurry, of rush and worry, in this age when the prime pursuit of most men centers itself in a struggle for the deceptive dollar, that the art of being a gentleman is almost a lost art. And yet true gentlemanliness was never more appreciated than it is to-day, and the rewards for being a gentleman were never greater. Especially do the environments of a practitioner of dentistry call for gentlemanly qualities. A dentist should be cleanly and careful; he should be tasty and temperate. He should be perfectly poised, pure-minded, and polite. He should preserve his honor as if it were the most precious flower in the human heart. He should never forget that one of his chief functions as a dentist is to lend dignity to his calling; one of his chief duties as a man to elevate, in however small a degree, the general tone of humanity. If he has in his mind these qualities, in his heart these sentiments, he is possessed of at least some of the main elements of true success.

TRANSLATIONS.

BILATERAL TWIN FORMATION OF THE UPPER MEDIAN INCISORS.

BY L. A. WEIL, M.D., D.D.S.,

LECTURER ON DENTISTRY AT THE ROYAL UNIVERSITY, MUNICH.

(Extracted and translated by the author, for the DENTAL COSMOS, from his paper in the *Deutsche Monatsschrift für Zahnheilkunde*, March, 1893.)

THE growth (production) of twin teeth is, in general, of very rare occurrence. In the whole dental literature I have only met with a few cases of *unilateral*, but not a single case of *bilateral*, twin formation, except in the *Deutsche Vierteljahrsschrift für Zahnheilkunde*, vol. xx, 1882, page 17. It contains a casuistic communication from Schwarzkopf, in which he mentions having met with a case of *bilateral* twin formation on the median upper incisors in the mouth of a patient, but his description is very short and without plates. It would certainly have been of very great interest to know if the other teeth, especially the lateral incisors, were of normal condition and complete in number. I have no doubt, therefore, that the preparation I possess is a *unicum* worth publishing.

Many writers, speaking of the teratology of teeth, make no distinction between the different kinds of twin teeth or teeth growing together; on the contrary, they speak of them as one and the same thing, especially the English, under the name "osseous union": for instance, Fauchard, Hunter, Fox, Bell, Koecker, Goddard, Linderer, etc. Beginning from the time when the writings on dentistry became more scientific, we find a sharper distinction and a better separation of the several anomalies of this kind. I may mention here John Tomes, Wedl, and of the later writers, Magitot, Baume, and Litch.

Tomes's Fig. 108 has, at first sight, much resemblance with my case, but in his case only two regular upper incisors are fused together.

Wedl speaks of wisdom-teeth which are twin formed. He supposes that this anomaly can also occur in other teeth, but he has never seen it.

After what I have said, I consider that the different manners in which teeth unite should be scientifically classified similar to what Baume, Litch, and others have begun in their works. I may therefore be allowed to propose the following classes :

1. Two adjoining regular teeth, or a regular and a supernumerary one, or, in very rare cases, two supernumerary teeth may grow together by their crowns, as their enamel-organs unite, or by their roots through the cementum, or through both materials by crowns and roots, but each has its own *pulp-chamber*. This I may call the *simple coalescence* of teeth.

2. If the same kinds of teeth grow together through the uniting of two tooth-germs, and the teeth have one common *pulp-chamber*, then it is a *fusion* of teeth.

3. When we find a regular tooth fused together with its supernumerary neighbor of the *same kind*, or what has never been observed

FIG. 1.

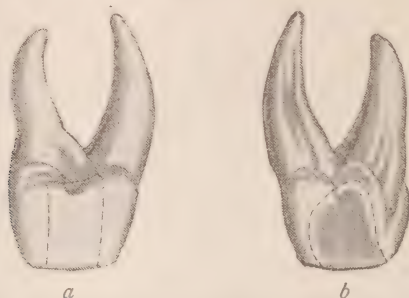


FIG. 1.—A twin-formed upper median regular and supernumerary incisor. *a*, the front of the tooth; *b*, the back.

if two supernumerary teeth of regular shape and size unite and have one common pulp-chamber, in these cases only could we speak of *twin teeth*.

All the cases above described occur during the time of development. They are therefore *vitia primæ formationis*. Only the coalescence of the cementum of a tooth with its alveolar walls or with the cementum of its neighbor may take place also in adult teeth. It arises from pathological conditions during the lifetime by *hyperostosis* of the cementum.

The specimen (Fig. 1) was extracted from the mouth of a young man sixteen years of age, on account of very extensive decay, which is indicated by the dotted lines *a*, *b*. It is the right upper median incisor, fused together with a supernumerary incisor of the same size and shape. This is a real "*twin formation*"; but what makes the case so much more interesting is that the patient had the same *twin-like median incisor* on the left side. All the other teeth of the upper jaw were complete in number, except, of course, the wisdom-teeth, and all of regular size and form. I especially accentuate this as dissociated from the lateral incisors. The whole case therefore repre-

sents a bilateral twin formation, an anomaly which, as I have already said, has never been observed before Schwarzkopff. Even unilateral twin teeth are very seldom to be found, and only with incisors and wisdom-teeth.

An example of the latter kind is to be found in Fig. 2. It is the impression of a lady's upper jaw. The supernumerary tooth is smaller

FIG. 2.



FIG. 2.—Upper jaw with two left wisdom- (twin-formation) teeth.

than the proper wisdom-tooth, but we must declare it as a wisdom-tooth, for it has the same shape and, moreover, three tubercles.

If the supernumerary tooth were an "embolus," the case would be a fusion, but no twin formation, as in Fig. 3. Here a supernumerary embolus is situated behind the wisdom-tooth, and the roots are united.

FIG. 3.

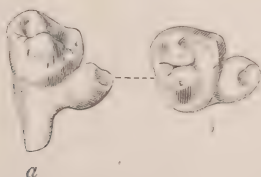


FIG. 4.



FIG. 3.—An upper left wisdom-tooth, on the lateral part fused together with an "embolus" through the roots. *a*, view of the palatal surface; *b*, of the chewing surface.

FIG. 4.—Coalescence of two lower median temporary incisors. *a*, the front; *b*, lingual part.

The last (Fig. 4) represents a *coalescence* of two median lower temporary incisors during the development. On the lingual surfaces we see distinctly the resorption from contact of the permanent teeth.

Concerning the development of supernumerary teeth, I cannot

accept in all cases the theory of atavism. No doubt in tertiary time man had as many teeth as mammalia,—three incisors, one cuspid, four bicuspid, and three molars,—but the supernumerary teeth are often of such a starved shape, such an irregular size and position, that we cannot always accept them as an equivalent for their predecessors. As Busch rightly says, they often amount to five in number, which number never existed in tertiary man.

With supernumerary teeth of normal size and shape this is never the case. We may therefore account for them upon the theory of atavism, and believe that nature has returned to its former practice and has formed two tooth-germs instead of one. Moreover, we have the right to this opinion, as Fig. 1 has demonstrated the fact of *bilateral* twin formation,—that is to say, of the existence of supernumerary teeth of regular shape and size on both sides,—a fact which is much nearer the former relations than the preceding. The case of twin formation on wisdom-teeth does not militate against this theory, for even now many monks have, as a rule, four wisdom-teeth, and in colored people this augmentation is not rare.

That in my case the supernumerary teeth of normal shape and size should be fused together with their neighbors may be explained by the narrow space, which allowed of only the development of one tooth-bag, or which made it impossible for the inner walls of the tooth-bags to grow inside.

OXYQUINASEPTOL (DIAPHATHERIN), A NEW ANTISEPTIC.

BY DR. MED. BRANDT, BERLIN.

(Translated by WILLIAM LOMBARDINO, D.M.D., Berlin, Germany.)

WE possess quite a number of antiseptics of which the advantages and disadvantages are universally known. If, however, the anti-bacterial properties of many preparations—as, for instance, carbolic acid, sublimate, iodoform, etc.—are sufficient, in case of exact application, to obtain satisfactory results, we are still not able to ignore the fact that certain unpleasant characteristics may cause the employment of these drugs to act disturbingly.

These latter are chiefly the irritating or cauterizing effect, and at times penetrating odor, of individual antiseptics, on which account they are scarcely employable in dental practice. The production of an antiseptic possessing an energetic antiseptic action, and free from all the unpleasant accompanying properties which other preparations have, has been obtained at the chemical laboratory of Lembach and Schleicher in Biebrich-on-the-Rhine. This new preparation, which has the chemical formula $(\text{HO}-\text{C}_6\text{H}_4\text{NH}-\text{O}-\text{SO}_2-\text{C}_6\text{H}_4-\text{O}-\text{NH}-\text{C}_6\text{H}_5-\text{OH})$, was named oxyquinaseptol, or diaphtherin.

Oxyquinaseptol is, according to the examinations of Emmerich (*Münchener med. Wochenschrift*, 1892, No. 19), presumably a union of two molecules of oxyquinolin and one molecule of aseptol,—i.e., phenolsulfonic acid,—and is distinguished in comparison with other antiseptics by its energetic antiseptic action and almost complete absence of caustic effect.

Regarding the results of the anti-bacterial effects of oxyquinaseptol, Emmerich gives us information which he obtained from his com-

parative experiments with diaphtherin and other antiseptics at present in use. These experiments show that 0.3 per cent. solutions possess anti-bacterial properties, and that one per cent. solutions are sufficient for the treatment of wounds, while diaphtherin is at the same time the least poisonous of the other antiseptics. He also substantiates the specific healing effect of this preparation. On account of Emmerich's chemical and bacterial experiments with regard to the external action of oxyquinaseptol, Kronacher (Munich) used the preparation a whole year in many surgical diseases with highly satisfactory results. He employed one-half to two per cent. solutions, and prefers diaphtherin to carbolic acid or sublimate on account of its extreme antiseptic properties in small concentrations, and because of its insignificant poisonous effects.

In consequence of the important anti-bacterial power and excellent results obtained with the use of diaphtherin in surgery, I have for some time made use of this preparation in dentistry. It is prescribed in powder or pill form, and in thirty to fifty per cent. solutions.

The non-precipitated oxyquinaseptol is of a yellowish sulfur color, and possesses a slight phenol odor, while the precipitate is white. I have made use of the yellow powder in case of abscesses, fistulous openings, and suppuration from necrosis of the jaw-bones. I have employed the white precipitate as an antiseptic dressing in putrescent teeth. I have had wonderful results, in every respect satisfactory, consequently I am convinced and can assert that at the present time no antiseptic material exists which is more valuable for like cases than diaphtherin.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, March 14, 1893, in the New York Academy of Medicine, No. 17 West Forty-third street, the president, Dr. William Carr, in the chair.

INCIDENTS OF OFFICE PRACTICE.

Dr. Nelson T. Shields. I have some considerations under the head of scientific dentistry, which I desire to present to you. They come under the two great headings compatibility and incompatibility of gold, and scientific root-filling. We all know and will admit that surgery is the mathematics of medicine, and as mathematical problems can always be proven, I come here ready to substantiate by our mathematics—surgery and facts—the statements that I make.

It has been maintained by many operators that gold is absolutely incompatible with soft tooth-structure, but that teeth of hard structure can be filled with gold, and satisfactory and permanent results obtained. According to my practice, the first assertion is a great mistake. For example, take a large approximal cavity in a bicuspid. I always combine a large approximal cavity with the grinding-surface fissure, because if you leave the fissure or fill it separately, you place the thin structure between the two fillings in a fine condition to break,

which will make one or both fillings defective, and decay will surely follow. Leave no frail overlapping edges, but break them in from the grinding-surface, and when finished the space between the teeth will necessarily be V-shaped; likewise break in the frail edges on the grinding-surface and leave not a trace of the fissure, because if the filling should end in a fissure a pit is compelled to result, and this pit will hold acids and decay will follow. When the cavity is thus prepared, the whole cavity will likewise be V-shaped, which is exactly the reverse of the usual mechanism. Now make retaining-points at the cervical margin and in the grinding-surface, then with great care build up with cohesive gold. Build up this tooth exactly to its anatomical contour, which will restore the grinding-surface. This filling, if properly done, will finish without a flaw, and the adaptation of the gold to the tooth will be perfect. To introduce gold I use the electric mallet. Always finish your fillings artistically, from cervical margin to grinding-surface, not leaving a single infinitesimal defect for the collection of acids and at some future time sure decay. Soft tooth-structure treated in this manner will remain good not only for two or three years, but at the expiration of ten, twenty, or thirty years the tooth will be exactly in the same beautiful condition that it was the day it left the office, unless the patient has diphtheria or some other dreadful disease where the teeth necessarily are very much neglected and strong medicines used. It is not the incompatibility of gold in a soft tooth that makes it decay, and it is not the compatibility of gold in a hard tooth that enables it to remain longer without decaying. It is simply in the first instance a case of defective workmanship,—bad mechanism in the preparation of cavities, and a careless introduction of the gold. Defective work in poor tooth-structure soon manifests itself, but defective work in good tooth-structure resists longer.

All operative dentistry is minor surgery, and when you again read of the dark lines that come around gold fillings, and the explanation given is that the gold is not compatible with your tooth-structure, most positively do not believe it. It is simply a defective filling, and it is leaking. Gold casts but one shadow, and that is yellow; therefore dark lines are the results of leaking fillings, and incompatibility of gold has nothing to do with it. I am here to prove these statements. If any of you have a case where the tooth-structure is too soft to fill with gold on account of incompatibility, I will fill the teeth with gold as described, and at the expiration of two, three, and, I will add, ten or twenty years, this society can examine the teeth and proclaim the fact that incompatibility of gold with soft tooth-structure is a thing of the past.

As to scientific root-filling, this is a subject that you have had liberally discussed in this society. I am prepared to say that the anterior roots of all lower molars, the buccal roots of all superior molars, the bifurcated canals of inferior incisors, and the bifurcated canals of superior first bicuspid can invariably be filled. That is a strong statement, but I am able to substantiate it. If you find a first bicuspid, the root of which has two or three different curves, twisting backward into a knot, it is exactly like a great deformity that a person sees in a museum once in a lifetime. If we find one such case, shall we discard all others? I have never found a canal, during my prac-

tice of nearly fourteen years, which I could not enter with a fine Donaldson nerve-canal cleanser. Always open into the pulp-chamber well with a bur, not with an excavator, and take a Donaldson No. 5 all fine nerve-canal cleanser. You can in ninety-nine out of one hundred cases carry that instrument directly to the apex without any difficulty. In the one case that exists in every hundred you might not be able to do it; in that case, take a nerve-canal cleanser No. 5, and you will be able to get the end of it an infinitesimal distance into the canal; give it a gentle twist, and you will find that you get a small particle of tooth-structure with it. Putting it back again, give it the upward and downward motion, and you can get into the canal a little farther. It may take an hour and a half to get to the apex, but that is the one case in a hundred. If that root has a curve, you will find when you reach the curved portion that the cleanser will stop; just at this point use gentle pressure on the cleanser, and at the same time rotate it; now hold the instrument very firmly, so that it will not rotate on removal, and the exact direction of the curved portion of the root will be indicated by the curved point of the cleanser. Now introduce this curved cleanser in its proper direction and use the upward and downward motion, which not only enables you to gradually reach the apex, but it enlarges the canal. After you reach the apex with this small No. 5, take a small No. 4, then a larger No. 4, until you get this hair-like canal any size you desire, by each time bending the cleanser according to the direction of the curvature. Having gotten the desired size, I next take a Donaldson nerve-extractor,—which, by the way, should never have been made for a nerve-extractor,—take a pair of nipping-forceps, and nip off the hook; then with the Scotch stone make it very fine, if it is necessary, and carry it directly to the apex, which you can do very easily. Then take a little piece of rubber-dam and puncture it with the small instrument, make it come directly to the cutting-surface of the tooth when the end of the instrument is at the apex of the root. After I get the exact length of the root with this small instrument, I next fit as large an instrument as the canal will allow, getting the exact length by the small instrument, and when fitted the small piece of rubber-dam will indicate the same length on both instruments. This done, I am ready to fill the root with gold. I always use No. 4 soft gold foil. The size of the gold is regulated by the size of the canal. Frequently I use gold cut into small pieces, after being folded once, that are not larger than the quarter of a pin-head. In small canals I use small pieces of gold, thereby causing no air-pressure. If you should happen to get a piece a little too large and cause air-pressure, it will be indicated not only by the patient flinching, but the rubber-dam indicator will not be even with the cutting- or grinding-surfaces; in this case all you have to do is simply to insert your Donaldson nerve-canal cleanser and rotate it, and the gold will come out on the end of it. Be sure always to use your gold small enough to allow the air to be displaced without pressure. After this first piece is placed at the apex, carry the next in contact with it, and continue the other pieces with pressure for solidity. Both pieces will be indicated by the rubber-dam as being at the apex, because as you carry gold to the apex the rubber-dam indicator gradually comes farther and farther away from the tooth until you have the whole root filled.

And when I finish with this operation, I do not think, but I *know*, that the root has been scientifically filled from its very apex. By the way of contrast, take chloro-percha root-fillers, they *invariably* depend upon the flinching of the patient as an indication that the filling has reached the apex. Remember, a pressure of air will cause the same pain, and the root may not be filled half-way to the apex. The chloro-percha being semi-liquid, the air can readily press it back, and hence no more pain at that time will follow. Chloro-percha root-filling, therefore, is guesswork, and highly unscientific. No liquid nor semi-liquid filling-materials should be used for filling roots, because one cannot *know* that the material is at the apex; but when you have the exact length of the root, and you carry a small piece of gold to the apex, you *know* it is there because of the rubber indicator being a very small distance from the tooth, on account of the little piece of gold occupying that little space; it gives a satisfaction both to the patient and the operator, because a *permanently healthy* condition is compelled to follow. If a root is very badly curved,—at right angles, for instance,—it will not admit of very much enlarging, on account of going through the curved portion; with this root I ascertain the exact length and indicate it, and if the canal still is very small and very badly curved, I fill the entire root with amalgam, using pieces one-quarter of the size of a pin-head. I always flatten the end of the instrument on a Scotch oil-stone before filling with either gold or amalgam.

I filled a root before the Southern Dental Association, about five years ago, that the whole association said was impossible to fill. It was a superior wisdom-tooth, the palatal root of which was curved at a right angle. I filled it in an hour and a half, including cleaning it out. I filled this root with amalgam to its apex, and proved the fact by grinding the root laterally, exposing the filling all along. This was published in the DENTAL COSMOS (vol. xxxi, p. 806), with a cut of the tooth, made from the tooth itself. If any of you have cases of impossible root-filling, I shall be happy to make an appointment with your patient, and with you at the same hour, and demonstrate this surgically scientific method for the benefit of mankind.

I could not do a more diabolical thing than to crown a root if it was impossible to fill it. In the April number of the DENTAL COSMOS you will find cases of twenty-four and thirty-two crowns in one mouth, and you can rest assured that those roots are filled to their respective apices. If a case should come to me with a superior right first molar and superior right second bicuspid extracted, I would have no hesitation whatsoever in devitalizing the pulps of the second molar and first bicuspid, because I know I can fill them to their apices, and therefore they will not give trouble, but will give permanent comfort and enable me to perfect that imperfect grinding-apparatus with a bridge as described in the March and April numbers of the COSMOS.

In cases of crowning, I do not trust alone to gold to fill the root. I fill with gold about the twentieth of an inch, then I add amalgam so as to hermetically seal the root, so that any amount of pressure can be used to set the bridge with cement without any danger of air pressing beyond my root-filling. Amalgam is introduced in small pieces, and with the same consistence as when used for regular filling. Only a small quantity is necessary, and that quickly hardens and leaves

the root in a fine condition for crowning. The profession cannot dispense with crown-work, and it is without foundation unless we fill roots upon strictly scientific principles.

Dr. S. C. G. Watkins, of New Jersey. I should like to ask Dr. Shields why he prefers gold to other materials for filling entirely to the apex. Why does he persist with the broach in opening the canal, instead of drilling as far as he can with the drill? I would like to invite him to prove his method before the New Jersey State Dental Society in July.

Dr. Shields. In answer to Dr. Watkins, as to why I prefer gold, I would say that usually at the apex a pellet of cotton is carried, which is horrible treatment and highly unscientific. The gold is put there in case you use gutta-percha, amalgam, or any cement to fill the root, first to prevent the pressure of air of some filling-materials, and secondly, to prevent the filling-material from going through the apex. Suppose you want to fill with gutta-percha in solid form. The least pressure would carry air, and that would be obstructed by the gold; besides, gold is a royal metal, not capable of any changes, and by all means the best material that can be used at the apex of a root or anywhere else in the teeth. Drills should never be used in opening small canals, on account of the great liability to drill through the root, and you are also liable to obstruct the canal with small pieces of tooth-structure, which give great trouble in removing them.

Dr. Watkins. Would the gold not cause an air-pressure?

Dr. Shields. It will not cause air-pressure if the size of the gold is regulated to the size of the canal. The pieces should be small enough to allow the air to escape while carrying them to the apex, and the instrument should be of a size that will not go through the root.

Dr. Watkins. Do you consider that gold where it is soft enough to be removed with a broach hermetically seals the foramen?

Dr. Shields. Only the first piece or two are introduced so gently. I always have my gold very solid at the apex, but you cannot drive the first piece with great pressure. The gold used, remember, is No. 4 soft gold in small pieces, and two or three pieces do not occupy much space. When you begin to use pressure you make a solid root-filling; and unless I crown the tooth I fill the whole root with gold, and the root is hermetically sealed.

Dr. Watkins. Why do you use broaches entirely?

Dr. Shields. Whenever you come to drill a root, you are always liable to cause trouble. An exceedingly careful operator will seldom do it, but most operators do have that difficulty. There is no earthly necessity for it. If you take a No. 4 Donaldson nerve-cleanser and get your root that size, it will be all right. I enlarge every canal, so as to make it easier for me, and also that there may be no portion of the pulp left. It must be all removed, so there is not a particle of sensitiveness there. Teeth are seldom longer than thirteen lines, and if you go down twelve lines, you know you are at the end of the root. If the tooth has a curve, you will not go up an inch; you will find that you have an irregularity. When you have found out the nature of the irregularity, it is an easy matter to overcome it.

Dr. William Jarvie. I understood Dr. Shields to say that sometimes in putting in the first piece of gold it was pushed too far and

made to protrude through the foramen, and that this condition was indicated by pain, and if the condition was allowed to remain the pain would continue and there would be a very sore tooth. The speaker said he took a broach and removed the gold, but the query occurred to me, *How* did he do it? In my hands it would be an almost impossible operation. I would like further information on that subject.

As I started for the meeting this evening, I wondered whether it would pay me to come so far. But I have learned that at least one gentleman can do very readily, and in all cases, what I in the great majority of cases have never been able to do, namely: fill the buccal roots of upper molars with ease ninety-nine times out of one hundred, and do it also in the one time out of that hundred, with a little labor and time. I think the gentleman is able to do a great service to the dental profession and to the public, because it is generally conceded, even by expert operators, that such roots invariably give them great trouble. Almost all the cases of abscess that we ever have on the superior molars are abscesses on the buccal roots, caused by the non-removal of the entire pulp. In answer to a question propounded a year or more ago by Dr. Ottolengui to members of the profession, cards having been sent to many dentists, almost every one stated that he was rarely able to reach the foramen of the buccal roots of upper molars. This gentleman succeeds so universally in those cases that I think he ought to be invited to give a clinic and demonstrate his method and prove his success, and so place the dental profession and the community at large under a debt of everlasting gratitude to him.

Dr. Rhein. I would like to ask Dr. Shields whether after having filled the apex of roots with gold and then added amalgam, he has ever examined any of those canals, and if he is aware of the fact that amalgam has a powerful disintegrating effect on gold? What effect that may have on the condition of the apex I do not pretend to say; but from his having used this material in the manner described, he undoubtedly has given this phase of the question some consideration.

Dr. Shields. The apex of the roots being filled with gold and the amalgam added, I have never had occasion to find out. They have never given any trouble. It places the root in a scientific atmosphere. We know we get the gold at the end of the root; it is done by mathematical, surgical calculation. I filled a root of a superior central, about four months ago, entirely with gold, preparatory to filling the crown with gold. The patient afterward concluded to have it crowned. I cut out a great deal of the gold for my pivot, and I added a little amalgam. The patient went to Europe and returned a few days ago, and in preparing the root for the pivot I exposed just partially the junction of the gold and the amalgam, and it is beautiful. I always use S. S. White's "Globe" foil and gold and platinum alloy, and use it as above described.

Dr. Rhein. Where gold is added to amalgam it does not produce a disintegrating effect, but makes a gold amalgam. The addition of amalgam to gold is different, because of the affinity of the mercury in the amalgam for the gold acting continuously, destroying and disintegrating the homogeneous qualities of the gold, but not producing perfect amalgamation. I have proven this principle a number of

times, though never at the apex of the root ; but I suppose the principle would act as well there as anywhere else.

Dr. Shields. In the gold at the apex of the root we do not have a little lump of No. 4 soft. There is not a single layer ; we fill it about the twentieth of an inch, and the gold is solid. The amalgam does not come in contact with the apex of the root, and while, very much to my satisfaction, I have never seen the apex of a root that I have filled in this manner, I have many times in my practice had occasion to add amalgam where the whole buccal surface of an inferior molar was decayed, and a large grinding-surface cavity had been filled with gold, and the patient had not the time, and in some cases had not the money, to have it filled with gold. I always introduce my amalgam and add more than I want, so that when I cut it off all surplus mercury is removed, and it begins to harden at once ; then after hardening I always polish my amalgam fillings to their beautiful anatomical contour, so as to leave no lines at the junction between the filling and tooth, and never in a single case have I noticed any disintegration ; quite to the contrary, I have never seen anything but a beautifully polished junction. Introduce amalgam with good consistence and then add more with surplus squeezed out, and I will warrant you will find nothing but a beautiful junction, and the proof of this statement is that in thousands of cases treated in this manner I have not only filled the so-called impossible canals, but I have never had a failure.

Dr. M. L. Rhein. I wanted to show a couple of things at the clinic to-day, but as there was none, I have brought them with me to-night. Probably every member of this society has had an acquaintance, by this time, with the pyrozone preparations that McKesson & Robbins have introduced. The ethereal solution I found was rather difficult to apply, and the advantage of being able to use the peroxid of hydrogen without any trouble in deep pockets in pyorrhea alveolaris is very great. McKesson & Robbins got out an atomizer of such a nature that the fluid does not come in contact with anything except glass. The pyrozone can be sprayed directly into the pockets or around the gums wherever the inflammation exists. The apparatus they first brought me had a perfectly straight point, and it was not very convenient, so I had them modify it by suggesting these two shapes which I present for your inspection. One has the lower curve to reach the inferior teeth, and the other has an upper curve for the superior teeth. It can be handled with one hand in this way [illustrating], throwing the pyrozone directly into the pockets of any of the superior or inferior teeth. What I am now showing you is the five per cent. solution ; I should not use the twenty-five per cent. solution in this way, although they claim it can be done. It is such an admirable little instrument for the purpose, that I thought it worth showing. With it any pocket can be reached, and it takes up every drop of the pyrozone.

In the line of electric illumination, I have here a new form of lamp to exhibit. It is a modification of a European design made for medical purposes, and was manufactured for me by Mr. Otto Kloppe, a young electrician of this city. It consists, as you see, of a flexible piece of steel which fits snugly over the scalp, running from the occipital protuberance to the center of the forehead ; at this point are attached a couple of disks of compressed paper, to which is riveted a small steel

bracket in which is screwed the illuminator. The one I am using is a two-candle lamp, capable of using about three volts, though one more powerful can be used; this is attached to another disk of compressed paper in such a manner that a new lamp can readily be inserted if needed. Around this you notice this metal sheath, over which is fitted a steel cylinder on the end of which is screwed a corrugated hollow metal cap, in which is fitted a carefully ground glass bull's-eye, the drawing out of which concentrates the rays of light, and pushing it back correspondingly widens the area of illumination. The entire illuminator swings in the little bracket on a simple hinge, so that though it can be easily turned it nevertheless retains its fixed angle without the free play that a ball-and-socket connection would give. The wires run over the head in little guards on the metal cap. About a foot from the head we find the wires entering this block of compressed paper, which has a hook to attach it to the operator's button-hole. In this block by means of a little screw the connection can be instantly made and as readily broken, and the remaining wires can then be as long as desirable.

The great advantage of this apparatus to us consists in giving a powerful light that we can throw directly and at short range to any point, which at the same time is absolutely out of our way, leaving both hands unencumbered. I have found it especially useful for illuminating root-canals while at work upon them, and can recommend it highly as a very useful instrument for daily use.

The president then introduced Dr. Edward C. Kirk, of Philadelphia, who read a paper entitled "The Question of Local Anesthetic Nostrums," which will be found on page 354 of the current number.

Discussion.

Privilege of the floor was extended to Dr. W. Irving Thayer, who spoke as follows:

I wish to say that I have been greatly entertained by the paper we have just heard. It has been intimated that I have hidden from the profession the fact that my "No. 2" preparation contained cocain. That has not been the case here in New York to any one who has had the privilege of seeing either the agent or myself. There is cocain in it, and I never have denied it. In my "No. 1," which will obtund any dentine, there is, as you will find, no cocain, but there is some in the "No. 2." Reference has been made to the fact that in "No. 2" the anesthesia will commence in ten seconds and last five minutes. That is strictly true, and has never been accomplished before, that I know of.

With regard to the danger of cocain, I wish to quote Martindale,—and there is no English author who is better posted than he. Referring to cases of toxic effects of cocain, he states that in one case a druggist attempted to commit suicide, and swallowed twenty-three grains, but recovered very nicely; another person swallowed thirty-two grains, and after eleven hours' sleep had slight dizziness, but afterward recovered. It does not give the age of the patients. Another person swallowed twenty grains and got over it. Martindale quotes 8468 cases of the application of cocain for ophthalmia, 683 for ophthalmic operations, 936 for laryngeal, 975 for nasal, etc.,

so that probably there are quoted some fifteen or sixteen thousand cases. There are here quoted 17,424 cases in dentistry, with no ill effects. I wish to call your attention to the fact that a chemical analysis of an inorganic composition is a very uncertain thing. That is acknowledged by the best chemists in the country. So that when an analysis is offered for your consideration, of an inorganic substance, you may make calculations that there is some chance for error. There are certain remedies that are so similar in their composition that you cannot tell what they are, except by their physiological action. For instance, you take an organic substance such as morphin, and very little is known about it; cocain is still less known than morphin. It is supposed that chemists have those things down very well, but I do not think they have.

Dr. Kirk. The same analytical method was used in the examination of all of the preparations which I have cited in my paper, and you are satisfied that the chemical analysis shows the presence of cocain in your preparation?

Dr. Thayer. I do not say that it is absolutely incorrect. It is there probably in all those preparations. The analysis is approximately true, but not absolutely so. There are many things which are so similar that they cannot be told apart. With regard to the danger of cocain, I will admit that if large quantities are used indiscriminately there is more or less danger; but with the minimum quantity that there is in my compound, I do not believe there is any danger. I have used it in hundreds of cases, and I have yet to see any deleterious effects. Its principal object is for topical use, such as putting on crowns and for dam work.

The President. We have Dr. Holmes, of the Sixth District, with us to-night, and we would like to hear from him on this subject.

Dr. A. M. Holmes. I know but little of the effect of these nostrums on the physical system in my own practice, for I have not indulged in their use. I have never believed in the use or application of those drugs, and I have no knowledge of their effects on the system. I think that the use of cocain, no matter how small the quantity, from what I have read and have known of it personally, is very dangerous, especially hypodermically. I have seen a number of persons who have fainted under the use of one and two per cent. preparations of cocain, that were introduced for the purpose of surgical operations in opening abscesses, and it has been so serious that I never had the courage to undertake to use it in that way. My opinion is that all of these agents that are used for the purpose of extracting teeth are based on cocain.

Dr. Rhein. The essayist of the evening is unquestionably entitled to the thanks of our society, and of every dentist in our land whom the publication of this essay will reach, as well as of every citizen and every member of our clientele. It is time that a paper of this kind received a broad publication. The matter has been discussed privately for years, and the evil effects have been generally known, but up to the present time no one has taken the trouble to publicly place our profession in a position where we could come out and condemn this illegitimate use of toxic remedies. The point came up in this society a few years ago, when I had charge of the clinics, and in a report of one of the clinics I took the position which the essayist took this

evening,—that we, as a profession, ought to do something to inform the public, and those members of our profession who do not attend our meetings, that we were opposed, from every sense of duty to ourselves and to the public generally, to the use of any preparation of which we knew nothing. I think the fact that the essayist has written this paper and given his time to it demonstrates the need for an emphatic expression of our position in this matter. It has been shown clearly that it is not a question of not advocating the use of cocain, and I did not understand it as a discussion of anesthetic properties, but as a denunciation of secret nostrums used by professional men; and the fact that so many of our members have been guilty of using a thing without knowing what it was, is proof that we should take a positive stand in this matter.

I do not think it is at all necessary for us to discuss this question, because the hearty applause which the paper elicited showed the accord and the sympathy that it met with from every one; and in view of the statements of the essayist, I have written out a resolution which I think somewhat covers the ground. If any one can better it by an amendment, I shall be pleased to accept it. It is as follows:

Resolved, That the First District Dental Society of the State of New York, in accordance with its sense of ethical duty, and especially in behalf of the welfare of the public health, strongly condemns the use of secret nostrums by any member of the profession.

Dr. W. Jarvie. I am sure that the dental profession is very much indebted to the essayist for the enterprise displayed in getting together these facts, the directness with which he has presented them to us, and the courage and the pluck that he has shown in denouncing the use of nostrums. I have had no experience in the use of any of these so-called local anesthetics, because I am constitutionally opposed, in the first place, to using any compound of which I know not the ingredients, and I am opposed also to assisting in any way the individuals who have attended dental meetings for years, getting all the knowledge, all the information they could from the members, and then, when they have acquired something of value themselves, they decline to impart it to others until they are paid an exorbitant price in dollars and cents for it. I am opposed to the use of local anesthetics, especially where cocain is employed. It is only in rare instances that we are justified in using a drug that is so powerful as to destroy sensation, for the relief of a little pain. Where a long or difficult operation is to be performed, or during which it is necessary to have the patient perfectly passive, or one the shock of which might destroy life, surgeons are justified in using an anesthetic, but they are not justified in using it in a comparatively small operation.

When I commenced to practice, I used quite frequently nitrous-oxid gas, chloroform, and ether as anesthetics. The more I knew of them the less I liked to administer them, and finally I gave them up altogether. On several occasions since then, I have had a physician come in and administer chloroform under certain circumstances. I had one patient who persuaded me to give her a little whiff of chloroform, not sufficient to induce unconsciousness, but sufficient to lessen the sensibility to pain. I did this probably on half a dozen occasions, and it acted beautifully each time. This same patient was in another

city, suffering pain, and went to a dentist for relief, and insisted that he should give her chloroform. He declined to do it without the presence of a physician. The physician came, and the chloroform was administered,—a very small dose,—but the young lady died in the chair. Every precaution was taken during inhalation, and every effort made at resuscitation, but in vain. This teaches us a lesson. We know that cocain, in many cases, results disastrously. Are we justified in using an agent that may result so fatally for the sake of destroying the amount of pain that we wish to destroy? I think not. You may give chloroform a thousand times without bad results. The thousand and first time the patient may die in your chair, and what position are you placed in? Would you ever get over it? The same with cocain.

The same objections that have been urged against the use of nostrums for inducing local anesthesia may be urged against those used for obtunding sensitive dentine. We do not know what agents we are employing. The vendors of the nostrums are not to be believed. As the essayist has proven by the analyses he has given us, all but one of those examined and which are sold for producing local anesthesia contained cocain, although in printed circulars it was expressly denied that they contained it. So with certain nostrums sold for obtunding sensitive dentine. The manufacturer claimed that there was no arsenic in his preparation, while a careful analysis proved that every one analyzed contained sufficient arsenic to produce death of the pulp. Many thanks to the editor of the *Cosmos* for the good work he has undertaken in giving to us the analyses of these nostrums and the crusade he has instituted against their use.

Dr. C. A. Meeker. I was very glad to listen to Dr. Kirk's paper, for two reasons. One is, that it will give us a published list of local anesthetic nostrums, that we can use and show to our patients. It is wonderful to note the number of intelligent people who come to us and say that such and such a person has been using a secret preparation that does not hurt at all. I say I do not use it,—that there are other remedies that I can use. Now I can show them that every one of those preparations so far examined contains cocain, except Barr's.

Dr. R. M. Sanger. I want to thank Dr. Kirk for this paper. I regret that it cannot receive the wide advertisement that these nostrums receive. I have been annoyed a number of times by people bringing in to me extracts from the newspapers for my perusal, to show me that I was not practicing dentistry according to modern methods, with the view of having me use those preparations and save them some pain. The use of cocain in dental practice has been decried for a number of years privately. In medical circles it has been recognized as a dangerous agent for a long time. Dr. Thayer's quotations prove nothing, because it has been demonstrated that where heavy doses of cocain could apparently be used with safety the drug seemed to become inert in quantity, while in smaller doses it seemed to possess greater activity and more danger. This seems to be pretty well demonstrated, and should not be lost sight of. I want to say again that I wish this paper could be published in the secular press as well as in the dental magazines, and thereby help to instruct the public and save the dentists from the constant annoyance which the perusal of these newspaper articles has brought upon us.

Dr. A. L. Northrop. We have brought before this society, at clinics, nostrums that we know nothing about. Some of the members of this society will give a certificate, after using it, that they have had splendid success, and I think the First District Dental Society ought not to be afraid to stand out and say, "We will not encourage anything that we know nothing about. We may use it, and for once it may seem to answer the purpose, but in other cases it may fail."

Dr. O. E. Hill. A gentleman appeared before the Second District Society with a nostrum, and desired to speak upon it. He was asked, "Of what is this composed?" He said, "That is a secret of mine." I happened to be president of the society, and I said to the gentleman, "You can say no more here. We will not allow any discussion on the subject in any way." He went to our clinic committee, but they absolutely refused to allow him to give a clinic. Before the Second District no man can get up with a secret nostrum and advance it in any way whatsoever. If he will tell us its composition, he can talk, otherwise not. I may say that I am very much pleased with Dr. Kirk's paper. I am delighted with his courage and the way he has presented the subject, and I think we ought to stand by him and refuse absolutely to allow any one to introduce any preparation of this kind before our meetings unless we know of what it is composed.

Dr. Kirk. I have a few words to say in closing the discussion. I am exceedingly gratified at the spirit which has been manifested in the discussion of the paper. It is about what I expected. There have been one or two points made that I would like to reply to. Dr. Meeker said that here we have a list of all of these preparations. I stated in the paper that their name is legion. They are growing up like a crop of mushrooms, and we hear of new ones every day. I have a full dozen of them in my cabinet that have not yet been analyzed. This work is going on in another direction, and you will hear from it again, so that the composition of these preparations as they arise will be made known to the dental profession. My paper is not an arraignment of the use of cocain in dentistry. I use it extensively myself. It is an arraignment of the illegitimate use of cocain disguised under a fanciful name, so that it is not known to the operator. A man who knows that he is using cocain is prepared to combat the excessive physiological action of the drug. His cabinet is provided with the proper antidotes to deal with it; but with a nostrum of which he does not know the ingredients he is utterly at sea, and I have merely indicated the danger that may occur. I have recited the opinions of many gentlemen to show that it might be dangerous under certain circumstances. It is exceedingly more dangerous, of course, where we know nothing about what we are using.

Dr. W. W. Walker. I believe the section of the Code of Ethics of the American Dental Association which Dr. Kirk quoted in his paper takes in exactly the resolution that Dr. Rhein has offered. If the society chooses to adopt that resolution, I think it will be only an indorsement of the Code of Ethics.

The resolution was then put to vote and unanimously adopted.

The society tendered to Dr. Kirk a vote of thanks for his paper.

Adjourned.

At the annual meeting held Tuesday evening, April 11, 1893, the following officers were elected for the ensuing year: William Carr,

president ; John I. Hart, vice-president ; Benjamin C. Nash, secretary ; Kasson C. Gibson, treasurer ; J. Bond Littig, librarian. Delegates to the State Dental Society, for four years : Henry J. Hull, Henry D. Hatch.

B. C. NASH, *Secretary*.

ABSTRACT OF A MEMORIAL MEETING OF THE CHICAGO DENTAL CLUB.

A REGULAR meeting of the Chicago Dental Club was held March 27, 1893, Dr. G. W. Haskins in the chair.

After the reading of the minutes of the previous meeting, the club resolved itself into a memorial meeting, and listened to speeches on the life and character of Dr. W. W. Allport.

The first speaker of the evening was Dr. L. P. Haskell, who, after giving a full biographical and historical sketch of the life of Dr. Allport, said,—

Dr. Allport was unique in his make-up as a dentist. It seemed as though he was "made to order" for an operator. A man of fine appearance, handsome, of commanding figure, pleasing in his manner, inspiring the confidence of his patients, of keen perceptions and sound judgment, remarkably deft in the use of instruments, rapid in his movements, a mechanic and an artist ; in fact, there seemed to be nothing lacking in qualifications for what he proved himself to be.—a dental operator without a peer. Not only this ; he was original in his methods. It was worth going a long distance to see him fill a cavity. Using but few instruments, and never at a loss as to the right one to use ; going straight to the mark, making every stroke tell in the preparation of the cavity ; then preparing his gold, he seized a pellet with the pliers, and passing it through the flame of the spirit lamp, quickly put it in place, and holding the pliers between his teeth, rapidly packed the gold until the cavity was full ; when polished, the product was a finished piece of work which saved the tooth. As I remember him before the days of modern appliances,—engines, electric motors, rubber-dam, mallets, etc.,—when the methods were far more difficult than now, twirling the bur in the fingers, using the file instead of the corundum and disk, the napkin instead of the dam, the hand-plugger instead of the mallet, and finishing appliances crude as compared with the present ones, and yet seldom occupying more than one hour in filling the most difficult cavities, he was truly a master of his art. Just in the matter of changing napkins during the process of filling a lower tooth, with the saliva welling up, it was done with a sleight of hand I never saw equaled.

I carried in my mouth for thirty-two years a gold filling in the posterior approximal cavity of an upper second molar, which could only be seen by the use of the mirror, which he was only fifteen minutes filling, and which was perfect when the tooth was extracted.

Some time in the '60's he commenced microscopical investigations as to the cause of the sensitiveness of dentine, the distribution of nerve-matter in the tooth-structure. He conferred with Professor Leidy, of Philadelphia, who seemed to agree with him in his conclusions.

About this time he performed a unique operation which excited much interest. It was the removal of a portion of the pulp in a molar tooth, dissecting a flap of periosteum and covering the pulp, and then covering this with a temporary filling of gutta-percha. After waiting a certain length of time, he removed the filling, and found a deposit of dentine over the pulp. This result he showed to many dentists from time to time for several years.

Dr. Allport was not only a fine operator, but he had fine taste in the arrangement of teeth for artificial dentures. In this he was unexcelled.

He was a good speaker, always able to express himself clearly and concisely, and equally also as a writer, as the papers he has written for the various societies and journals have shown. Among the earliest of these was a paper read in 1855 upon "Diseases of the Teeth," before the Cook County Medical Society, of which he was a member, giving the result of his investigations as to the effect of various acids upon the teeth. Later on was a valuable paper which he read before the Boston Academy of Dental Science, in which he took strong ground in favor of a division of practice, and educating a class of men exclusively in prosthetic dentistry. He had for many years labored assiduously in favor of the dental student being more thoroughly educated in medical knowledge,—in fact, went so far as to propose that the dental student should be educated in the medical college as a specialist, the same as the oculist, gynecologist, etc., and then to go outside of the college to learn to make artificial dentures.

Dr. Allport was a social man, fond of society, a good conversationalist. To the members of the profession he was always approachable, ready to communicate any information of interest to them, and glad to receive as well as to impart. To the young men he was especially accessible, and glad to take them to his chair, if a patient did not object, and show his method of operating, giving the *why* and the *wherefore* of each process. Such opportunities were highly appreciated by the recipients of his favors.

Dr. Allport was not apt to be hasty in his judgment of men and matters, and would carefully weigh the subject; but when once his mind was made up it was difficult to swerve him. As is usually the case with men of strong and determined character, he made some bitter enemies as well as earnest friends. It was his ambition to do all in his power to elevate his profession, and so in concerting measures with this in view he often had contests with others. In doing this he usually carried his point, for he was shrewd and knew how to marshal his forces.

Dr. Allport had his faults,—and who has not?—but his virtues far exceeded them. The former we will bury in his grave, the latter forever extol; and among the galaxy of names that have shed luster upon the pages of dental science none will shine brighter than that of Allport.

Dr. Eugene S. Talbot. How often do we record in our books the death of one who has spent many years in our profession; but who of us will leave behind the record of as many years of active life spent in dentistry as Dr. Allport?

With the respect of the profession and people at large and his great ability, it seemed as if he possessed all the requirements for a

successful practitioner. He was a disciple of the late Dr. Harris in believing that dentistry was a part of the great mother profession, medicine, and was instrumental in the establishment of the chair of dental and oral surgery in the seven medical colleges in Chicago; and also, that physicians might know something of the teeth and associate parts, he assisted in the formation of the section of dental and oral surgery in the American Medical Association. Since that time we have heard no more of the old subject, Is dentistry a specialty in medicine? That question has now been settled forever. Later he felt that many eminent dentists were prevented from becoming members of the association because they did not hold the degree of M.D. He framed a resolution, which was offered by Dr. N. S. Davis, ex-president of the association, which was adopted almost unanimously, there being only two dissenting voices, to the effect that graduates of such dental colleges that required a course of study equal to the best medical colleges should be admitted to membership in the association. Thus it seems that he has done all that was possible to draw the dental profession into the fold, and in 1882 he accomplished all that Dr. Harris dreamed and attempted in 1842.

My intimate acquaintance with him began in 1880, and I have always found him to be a man of integrity and honor, despising all that was low and seeking to elevate the profession. Strong in his likes and dislikes, and wholly unselfish, he was hated by many; but those who won his admiration can truly mourn for him. To the poor, struggling young student just starting out on life's rough sea he was a beacon-light, help in counsel and money coming from him when most needed and appreciated.

He was a firm friend and leader of the profession, always ready to put his shoulder to the wheel and help steer away from danger. The profession has been raised to a nobler standard by his having made it his life's work, and with the poet we can say,—

“Gone before us, O our brother,
To the spirit land;
Vainly look we for another
In thy place to stand.”

Dr. E. L. Clifford. Mr. Chairman, to be called upon for an expression of respect, a tribute of affection in memory of a loved friend, whose presence will never again lend light and dignity to our councils, is an honor and privilege I need scarcely say I appreciate.

My first recollections of the study of dentistry are fraught with reminiscences of Dr. Allport. A few years after my graduation, fate sent me to Chicago, and certainly one of my most cherished wishes was to become acquainted with him. Opportunity favored me at one of the meetings of our dental club, where for the first time I had the pleasure and honor of meeting him. Dr. Allport's warm, cordial manner disarmed me. The fear of critic or censor vanished. Our pleasant interview ended leaving with me the comfortable feeling of having gained a friend, and such time proved him to be, for in no emergency or dilemma did I ever find him indifferent to my solicitations or too busy to advise. And right here I shall quote his exact words when I felt, in duty to myself, bound to know how far or how often I might trespass upon his

valuable time. (We all know his time over his chair was liberally paid for.) His reply was, "Dr. Clifford, I have been practicing dentistry for nearly forty years, and I do not know that I have ever seen a day during that time that I did not have room enough on my appointment-books for another patient. There are practitioners who cannot take another patient, but I have not seen that time in my whole practice, and I have never seen the time when I was not able to welcome a friend and glad to have him call on me. When you come to see me you will always receive a warm welcome."

To me the death of Dr. Allport is indeed a personal loss, professionally and socially, and I shall always regard it as one of the greatest honors of my professional life in Chicago to have known him, to have been associated with him in the same building, to have met his family, to have dined with him and had him dine with me, and last, though sad indeed the duty, to have been selected as one of the active pall-bearers at his funeral, the last effort that I could put forth for him.

Dr. C. N. Johnson. I want to add my quota to what has been said regarding Dr. Allport. I became acquainted with him when I first came to Chicago, in the fall of 1884. I called on him armed with a letter of introduction from Dr. Haskell, and the result of that call was that Dr. Allport gave a private clinic at his own office, the victim of the clinic being Dr. Haskell. Several others had operated on Dr. Haskell, and finally he said to me, "You fill that next tooth." I picked up the instrument, and the moment I did so Dr. Allport made a remark that has inspired me ever since, that has encouraged me to do as good work as lay in my power.

I have been very intimately brought in contact with Dr. Allport recently, on account of circumstances which I will relate. Last fall the editor of the *National Magazine*, a journal of American history, approached Dr. Allport for his biography, and asked him to select some one to write it. He selected me. In going over his past life and the struggles of his youth, I was brought into intimate relationship with him, and I will recite one incident which I think illustrates a phase of Dr. Allport's character that few of his friends know about. He was infinitely tender-hearted.

After I had finished the biography, before sending it to the publisher I wanted to go over it with him to hear him verify the dates. I made an appointment with him to come to my office. He came, and I sat down and read the biography. In summing up the characteristics of the man, as any other biographer would do, I said something complimentary. It was nothing, however, but the truth. When I looked up, after reading it, I saw him sobbing like a child, and the tears streaming down his face. It was a revelation to me, a complete surprise. After he went to his office, he wrote me a letter of apology, as if a man needed to apologize for showing he had a tender heart.

In regard to Dr. Allport's ability, I saw something a short time since which was a monument to his skill. I was in his office, and he showed me some fillings that he had put in over forty-two years ago. They were doing good service, with every prospect of lasting as much longer, if the patient lived. I might go on and mention many things regarding my personal experience with him, but personal reminis-

cences, however interesting to his friends, are scarcely adequate in dealing with a character like his.

This man whom we are called upon to mourn to-day started life at the bottom of a rough and rugged hill. A stone met his first step. A rock stood towering above his tiny form. But he turned his face resolutely toward the summit, and never lost sight of the star of hope. Thorns were in his path, ready to pierce his quivering flesh. Pebbles rolled beneath his feet. Storms swept down the mountain-side, and threatened to carry him into the depths of the valley below. But, baring his breast to the blast, and lifting his brow toward the merest fleck of blue in the darkened canopy above, he never looked behind. When, for a moment, the force of adverse circumstance drove him struggling to the rear, he regained his lost ground by a burst of that magnificent courage which was his most conspicuous trait. His energies never flagged, his heart was never faint, and toiling on and on through a lifetime of endeavor, he was at last rewarded by the attainment of a greater height than is given most men to reach. And standing there on the summit of the mountain's highest peak, his heroic form sharply outlined against the limpid blue, he paused for a moment,—a moment all too brief. Looking back over the field of his accomplishments, he saw scattered down the mountain-side the forms of many friends, and as the light began to dim his eyes he waved his hand,—in prophecy and adieu,—and, turning, passed over into the limitless beyond.

We have nothing left but a memory; but so long as dentistry shall have a name, the individuality of Walter Webb Allport will live beside it.

Dr. Ira B. Crissman. I had the pleasure of making Dr. Allport's acquaintance at the organization of the Chicago Dental Club. Like Dr. Clifford, I always approached him with admiration, looking up to him with high esteem, seeming to feel my inferiority while in his presence.

I called on him when he was first taken ill, and found him very nervous, seemingly excited. After a lengthy interview he concluded by saying, "Doctor, I have a few enemies. We cannot seem to come to an agreement. I would willingly lie down to-night and die if there could be an adjusted understanding between us." It was a very solemn utterance from one so highly honored and respected. I never had anything to impress me so deeply.

I looked upon him as a beacon-light, a lighthouse that stands on a hill, only to be extinguished by death. I shall always remember him as a senior guardian, one willing at all times to lend a helping hand to his many friends and associates. I feel that I will be a better man and do better work for having known him,—“a bright star in the professional firmament eclipsed.”

Dr. E. J. Perry. I simply wish to testify to the high character of Dr. Allport. While I have not known him intimately, as some of you, I have been drawn to him by the quality of his cordiality, affability, sincerity, gentleness, courage, high professional character, attainments, and venerable presence. He was a splendid man. I shall ever cherish his memory.

Dr. A. E. Baldwin. Probably there is no member of the Chicago Dental Club who feels the loss personally of Dr. Allport more than

myself. The years that I have known him have been, and will be as time goes by, fraught with the most pleasant memories. I came to Chicago, entirely a stranger, as a student in our specialty. Among the first that I met was Dr. Allport, and what I am to-day I owe more to him than to myself. We all realize that a great man has gone from us,—a great man to the world at large in his influence and in his wide circle of acquaintance. It is surprising to me that he could find the time to be the help to me he was, and I find in talking with my friends that he also had time to devote to them and their interests. A man like Dr. Allport can do great and little things, and the little things have a greater influence in after-life than the great things. We can point to him as a professional man, as a friend of higher education and of advanced standards of learning.

A few years ago—you perhaps all know something of the circumstances—I was associated with Dr. Allport (by being an officer of the American Medical Association) in carrying out the formation of a section in the Ninth International Medical Congress, which met at Washington. I had a large correspondence in connection with that work, and was brought in intimate contact with him. One time while I was in his office I said to him, "Dr. Allport, you are the greatest man I have ever met in the dental ranks." "Why?" he asked me. I said, "For this reason: you set your mark, and you can bring the event to pass that will bring success to it better than any man I ever saw. This matter is going to succeed, and largely through your efforts." He sat back in his chair, wiped his glasses, looked at me, and said, "Do you know why?" I made some remark, but I do not exactly remember the words. He said, "I have been a practitioner of dentistry for many years and have been an observing man, and I have yet to be placed in a position where I did not advocate that which I firmly believed was right." Dr. Allport could grasp a point as quickly as any man I ever met. He was not working for this or that office, he was working for what he assumed to be right; and in the instances where I went to him for advice the first thing he wanted to grasp was the situation, and then his efforts would be directed toward doing thus or so, because he believed it was the right thing to do. I believe Dr. Allport should be noted more especially for (1) quickness of grasp, (2) his ability, and (3) his integrity and perseverance. There are very few men that I know of who would refuse the highest public office in connection with our specialty if it were offered them. I know that Dr. Allport did that, and others here know it. He had a reason for so doing. In a letter which he read to me regarding the matter he said, "I would consider it a great honor and privilege to accept such an office, but I do not think it would be for the best interests of dentistry for me to do so. Another man" (whom he named) "would do better than I could do, because some see fit to misinterpret my motives and actions, and we must find some one upon whom the profession can harmonize and work for this end." Is there anything grander that a man can do? Is there anything higher he can do than that? If there is, it is beyond my comprehension.

Twenty years from now, if we are living, we can understand this man's life better than we can to-day. It has been remarked that Dr. Allport had enemies. I believe he had, but he had fewer enemies than we think. There are those that had axes to grind, who had

political ends to attain, who knew that Dr. Allport was a stumbling-block in the way of getting these ends accomplished; and although he perhaps was disliked by some men, I believe there were very few men who did not in their hearts have the utmost respect and veneration for him. I shall prize his memory and the fact of such an intimate personal acquaintance with him. I shall always feel that I am a better man for having met and known Dr. Walter Webb Allport.

Dr. M. A. Newman. I think Dr. Allport was one of the few men whose words written or spoken upon subjects pertaining to dental science were always worthy the attention of the profession.

Dr. I. A. Freeman. I am probably one of the oldest members present who have known Dr. Allport. He was certainly at the head of the dental profession in this city, although there were other dentists as highly respected. Every dentist always held Dr. Allport in high esteem.

In his earlier as well as later years, he was advanced upon the subject of treatment of teeth and of the filling of root-canals. I recollect his remarks at a meeting of the American Dental Association in Crosby's Opera House, in 1865, where he outlined his process of treatment of diseased roots that had lost their crowns, and upon which he desired to place artificial crowns. At the same meeting he advocated the use of the rubber-dam introduced by Dr. Barnum. Dr. Allport has done much to help us toward a better, broader, and more helpful condition of things. Every dental student, old or young, is to-day indebted to Dr. Allport for the stimulus he gave to higher dental education. The benefits the public are receiving at their hands is a testimony to his memory.

The following resolutions were adopted :

WHEREAS, In view of the loss we have sustained by the decease of our friend and associate, Dr. W. W. Allport, and of the still greater loss sustained by those who were nearest and dearest to him; therefore be it

Resolved, That Dr. Allport was a man of good principles, lofty in his ideas, conscientious in his dealings, strong in his purpose for right, and far-sighted in the requirements of the profession, and that it is but a just tribute to the memory of the departed to say that, expressing our regret for his removal, we, the members of the Chicago Dental Club, mourn for one who was, in all respects, entitled to the regard and admiration of every one with whom he came in contact;

Resolved, That we sincerely condole with the family of the deceased on the dispensation with which it has pleased Divine Providence to afflict them, and commend them for consolation to Him who orders all things for the best and whose chastisements are administered in mercy;

Resolved, That this heartfelt testimonial of our sympathy and sorrow be forwarded to the family of our departed friend.

L. P. HASKELL,
E. S. TALBOT,
C. N. JOHNSON,

Committee.

CHICAGO DENTAL SOCIETY.

At the annual meeting of the Chicago Dental Society, held Tuesday evening, April 4, 1893, the following officers were elected for the ensuing year: J. W. Wassall, president; J. H. Woolly, first vice-president; Garrett Newkirk, second vice-president; L. L. Davis, recording secretary; George J. Dennis, corresponding secretary;

E. D. Swain, treasurer ; J. H. Smyser, librarian ; Board of Directors, Edmund Noyes, J. G. Reid, George H. Cushing ; Board of Censors, E. R. E. Carpenter, D. C. Bacon, H. W. Sale.

GEORGE J. DENNIS,
Corresponding Secretary.

VERMONT STATE DENTAL SOCIETY.

THE seventeenth annual meeting of the Vermont State Dental Society was held at the "Welden," St. Albans, Vt., March 15-17, 1893.

The following were elected officers for the ensuing year : Dr. A. J. Parker, president ; Dr. W. H. Wright, first vice-president ; Dr. E. O. Blanchard, second vice-president ; Dr. W. H. Munsell, treasurer ; Dr. T. Mound, secretary ; Drs. G. O. Webster, C. W. Staples, F. P. Mathers, executive committee ; G. W. Hoffmann, state prosecutor.

Dr. G. Lenox Curtis, of New York, and Dr. J. H. Collins, of Granville, N. Y., were made honorary members of the society.

The next meeting will be held at White River Junction, on the third Wednesday in March, 1894.

THOMAS MOUND, *Secretary*,
Rutland, Vt.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF IOWA—DENTAL DEPARTMENT.

THE eleventh annual commencement exercises of the Dental Department of the State University of Iowa were held at the opera house, Iowa City, Iowa, on Thursday, March 16, 1893, at 9.30 A.M.

The annual address was delivered by Professor Martin J. Wade, LL.B.

The number of matriculates for the session was one hundred and twenty.

The degree of D.D.S. was conferred on the following graduates by Charles A. Schaeffer, Ph.D., president of the university :

NAME.	STATE.	NAME.	STATE.
Theodore Ashley.....	Minnesota.	Joseph R. Kulp.....	Iowa.
Benson W. Fordyce.....	Iowa.	Henry S. Morgan.....	Iowa.
Anna Hamilton Joy.....	Iowa.	Samuel B. McNutt.....	Iowa.

MISSOURI DENTAL COLLEGE.

THE twenty-seventh annual commencement exercises of the Missouri Dental College (Dental Department of Washington University) were held, in connection with those of the medical department, at St. Louis, Mo., on Tuesday, March 14, 1893.

The valedictory address was delivered by Dr. Frank R. Fry.

The degree of D.D.S. was conferred on the following graduates : James Ambrose Hulen, James Linton Jenkins, and William E. Weller.

WESTERN DENTAL COLLEGE.

THE third annual commencement exercises of the Western Dental College were held at the Grand Avenue M. E. Church, Kansas City, Mo., on Tuesday evening, March 7, 1893.

The faculty address was delivered by Professor John Punton, the annual address by Rev. J. Z. Armstrong, Ph.D., LL.D., and the valedictory by Clifton Covert, D.D.S.

The number of matriculates for the session was ninety-three.

The degree of D.D.S. was conferred on the following graduates by D. J. McMillen, D.D.S., dean of the college:

A. E. Bonnell.
W. W. Bryan.

C. C. Covert.
I. L. Cullison.

Arthur J. Raffington.
W. J. Watkins.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

AT the annual meeting of the board of directors, held March 30, 1893, certificates of license to practice dentistry and the title L.D.S. were granted to the following gentlemen, who had fully complied with the curriculum and passed satisfactorily all the examinations, viz:

W. W. Alton, D.D.S.....Hamilton.

Joseph Brooks, D.D.S....Alliston.

George Albert Bentley...Forest.

Fred. T. Coghlan.....Guelph.

Harold Clark.....Toronto.

J. G. Coram.....Drayton.

W. A. Crowe, D.D.S....Tara.

S. R. Clemes.....Thornbury.

D. I. Dulmadge.....Brighton.

Horace E. Eaton, D.D.S.Toronto.

George S. Fowler.....Palmerston.

Edwin Forster.....Toronto.

George D. Scott.....Port Hope.

E. S. Hardie.....Tilsonburg.

George Hicks.....Talbotville.

John Irwin.....Collingwood.

R. J. Loughheed.....Toronto.

James Loftus.....Toronto.

C. H. Waldron, B.A.....Toronto.

Robert Meek.....Toronto.

J. W. Marshall.....Shelburne.

W. M. McGuire.....Waterford.

W. T. McGorman.....St. Marys.

E. A. Peaker.....Toronto.

J. C. S. Robertson.....Ottawa.

R. J. Robins.....Warminster.

D. E. Russell.....Hamilton.

C. J. Rodgers.....Toronto.

Colon E. Smith.....Bothwell.

Milo H. Steele, D.D.S.Arnrior.

J. A. Sanders.....Kemptville.

E. A. Harrington.....Toronto.

Charles Thompson.....Hamilton.

J. M. Turnbull.....Owen Sound.

Nelson Wager, B.A.....Napanee.

C. H. Wortman.....Napanee.

John E. Wilkinson.....Brampton.

All of the Province of Ontario, Canada.

No formal commencement is held.

DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN DENTAL ASSOCIATION.—CHANGE IN TIME OF MEETING.

OWING to a change in the time of meeting of the World's Columbian Dental Congress, it seemed a necessity to make a change in the time of meeting of the American Dental Association, and at the request of the officers of both the American Dental Association and the World's Columbian Dental Congress, I communicated with the officers of the former, and the vote was unanimous for changing the time of meeting of the American Dental Association.

Accordingly, we give notice that the meeting of the American Dental Association will be held in Chicago, August 12, instead of August 15.

By order of the Executive Committee.

J. N. CROUSE, *Chairman.*

WORLD'S COLUMBIAN DENTAL CONGRESS.—SPECIAL NOTICE.

To the Officers of Dental Societies in the United States and Foreign Countries:

GENTLEMEN,—The Committees on Membership and on Registration of the World's Columbian Dental Congress will be saved much trouble, and the applicants for membership much vexation, if dental societies will furnish to their members in good standing credentials or certificates of membership, so that they may be presented at the desk where intending members apply for their membership cards.

Membership cards in advance will be furnished on application to the secretary of the General Executive Committee or the secretary-general of the congress, when the membership fee (ten dollars) accompanies the application.

A. O. HUNT, *Secretary General Executive Committee,*

Iowa City, Iowa.

A. W. HARLAN, *Secretary-General of the Congress,*

No. 1000 Masonic Temple, Chicago, Ill.

COLUMBIA DENTAL CLUB, CHICAGO.

THE dentists of Chicago have organized the Columbia Dental Club for the entertainment of dentists visiting Chicago during the continuance of the Exposition. They have rented the entire house at 300 Michigan avenue (about four squares from the Art Palace, on the lake front), and it will be kept open daily for the convenience of dentists. The club will be used as headquarters for the World's Columbian Dental Congress during the month of August, and perhaps after July 15, 1893. Dentists who contemplate a visit to Chicago may have their letters addressed in care of the club.

Members of the profession in Michigan, Indiana, Wisconsin, Iowa, Missouri, and Kentucky are invited to send pictures, bric-a-brac, and curios to embellish the rooms. Everything of value will be returned to the owners after the Exposition closes. The profession in Illinois will furnish the clubhouse, and those who contribute fifteen dollars will be entitled to a full-paid, non-assessable membership for the six months.

On behalf of the organizers,

A. W. HARLAN,

Secretary-General World's Columbian Dental Congress.

CHICAGO MEDICAL PROFESSION COMMITTEE ON WORLD'S FAIR ENTERTAINMENT.

AT a meeting of the Joint Committee of the Chicago Medical Profession on World's Fair Entertainment, held at the Sherman House, November, 1892, the establishment of a Bureau of Information and Service was delegated, with approval and indorsement, to Charles Truax, Greene & Co., the committee reserving to itself the duty of such social entertainment of visiting physicians during the continuance of the Exposition as may seem desirable.

This action was confirmed at the final meeting of the Joint Committee, February 25, 1893, and on application of the Practitioners' Club and the South Side Medical Club, the matter of social entertainment was delegated to them, with full authority to act in the capacity of entertaining bodies, with the retention of the chairman and its American and foreign secretaries already appointed.

Chairman, Dr. Charles Warrington Earle, Dr. Archibald Church.

American Secretaries, Dr. George Henry Cleveland, Dr. John C. Cook, Dr. J. C. Culbertson.

British, Dr. Sanger Brown.

German, Dr. F. C. Hotz.

French, Dr. Fernand Henrotin.

Spanish, Dr. E. J. Gardiner.

Italian, Dr. A. Lagario.

Swedish, Dr. K. Sandberg.

Canadian, Dr. R. D. McArthur.

Russian, ———

The scope and duties of the above secretaries will be designated in the future.

C. WARRINGTON EARLE, *Chairman*.

JOINT MEETING OF THE ILLINOIS AND IOWA STATE DENTAL SOCIETIES.

THE twenty-ninth annual meeting of the Illinois State Dental Society will be held at Rock Island, May 9-12, inclusive. The thirtieth annual meeting of the Iowa State Dental Society will be held at Davenport, May 9-12, inclusive. These cities are located on opposite sides of the Mississippi River, and arrangements will be made to hold the meetings jointly, so that those in attendance at the meeting of either society will have an opportunity to listen to the papers, take part in the discussions, and witness the clinics of both societies. No efforts will be spared to make this union meeting one of the most interesting in the history of each society. Members of both societies are urgently requested to attend, and all dentists are cordially invited to be present. Every one should bring models, specimens, appliances, or anything that may be of interest to the profession.

LOUIS OTTOFY, *Secretary Illinois State Dental Society*, Chicago, Ill.

W. O. KULP, *Chairman Executive Committee, Iowa State Dental Society*, Davenport, Iowa.

UNION DENTAL MEETING IN CONNECTICUT.

THE Connecticut Valley Dental Society and the Connecticut State Dental Association will hold a union meeting at Hartford, Conn., on Tuesday, Wednesday, and Thursday, May 16, 17, and 18, 1893. Among the subjects to be presented are papers on the history of anesthesia, by those who were among the first to successfully use nitrous-oxid gas and ether; also papers on hypnotism, local anesthetics, and many other subjects of practical importance to members of the profession.

A cordial invitation is extended to members of dental societies.

GEORGE A. MAXFIELD, D.D.S.,

Secretary Connecticut Valley Dental Society.

MASSACHUSETTS DENTAL SOCIETY.

THE twenty eighth annual meeting of the Massachusetts Dental Society will be held in Huntington Hall, Institute of Technology, Boston, on Thursday and Friday, June 8 and 9, 1893.

The society will have as its guest, Professor Harrison Allen, M.D., of Philadelphia, who will give an address; other prominent men are expected to participate.

Members of the profession are cordially invited to be present.

By order of the Executive Committee.

EDGAR O. KINSMAN, *Secretary*,
Cambridge, Mass.

NEBRASKA STATE DENTAL SOCIETY.

THE Nebraska State Dental Society will hold its annual meeting, May 16, 17, 18, 1893, at Lincoln. An interesting meeting is promised.

A general invitation is given all to attend.

D. P. SIMS, *Cor. Secretary*, Lincoln, Neb.

BOARD OF CENSORS, DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE Board of Censors of the Dental Society of the State of New York will hold its annual meeting for examinations at Albany, on Tuesday, May 9, at 10 A.M. The law provides that "Said society shall admit to its examinations, provided for in section eight of this act, only the following classes of persons, upon satisfactory proof of good moral character:

"First. All duly licensed and registered dentists of this state.

"Second. All persons coming from other states or countries who shall present to said society satisfactory proof of having been lawfully engaged in the practice of dentistry without the state for the term of six years.

"Third. All such persons as shall have studied dentistry for a term of four years in the office or offices of some reputable and duly licensed and registered dentist or dentists of this state and shall have in other respects conformed to the regulations governing such examinations, which regulations not inconsistent with this act said society may make and must publish at least twice in each calendar year in a leading dental journal."

The regulations require each applicant to bring a certificate of good moral character and professional standing from the District Board of Censors of the district in which he resides.

Applicants from without the State of New York must bring such certificate signed by the president and secretary of a reputable dental society in the state from which they come.

Candidates will be examined in anatomy, physiology, histology, pathology, therapeutics, oral surgery, materia medica, chemistry, metallurgy, operative and mechanical dentistry.

EDITORIAL.

WOMEN DENTAL PRACTITIONERS AND THE WORLD'S COLUMBIAN DENTAL CONGRESS.

A SIGNIFICANT and important feature of the World's Columbian Dental Congress is the official recognition which it gives to the coequal professional status of men and women practitioners of dentistry. Places upon the list of essayists and of clinicians, both in the operative and mechanical departments, have been officially provided for women dentists, and on the part of the Executive Committee an earnest desire and disposition has been unanimously evinced to do everything within proper limits favoring their interests and giving them a fair representation. This is as it should be. In the plan and scope of the World's Columbian Dental Congress, as outlined in a previous editorial, no distinction is made on the basis of sex. Women practitioners of dentistry who are reputable and legally qualified will be admitted to active participation in the work of the congress on the same basis as men. The importance of this action by the Executive Committee will be evident to the large body of women dentists, whose especial field of usefulness has grown into a prominence which has made such an official recognition not only possible but necessary; and it is significant as well that whatever of prejudice has heretofore existed regarding the fitness of women for dental practice has been so far overcome that it is possible to hold a world's congress of dentists in which sex is not a factor of one's professional standing.

Besides the opportunities which the World's Columbian Dental Congress will afford to women practitioners for participation in its affairs on coequal terms with men, the Women's Dental Association of the United States will hold a special one-day's session in Chicago, during the time of the congress, in connection with which papers will be read and clinics held. A special headquarters for women dentists will be established, where all information connected with their work will be obtainable, and provision made for the care, comfort, and entertainment of all visiting women practitioners of dentistry. No such opportunity has heretofore been offered to women dentists to immediately profit by the work of such a congress, nor to make a showing of their professional progress and status, and thus fully demonstrate to the world the rightness of their cause. The door has been thrown wide open, and the indications are that such a showing will be made as will forever dispose of the question of the fitness of women to successfully practice dentistry. Confusion to some extent has grown out of the fact that another association of women will hold a meeting in Chicago in connection with which it has been proposed

to establish a dental section. Whatever may be done in this direction, while it may subserve good and proper ends as far as it may reach, will fail of the great and principal end to be achieved in the work of women dentists with respect to the World's Columbian Dental Congress,—viz, the abolition of sex distinction in professional matters, the establishment of professional equality between men and women dentists, and the special opportunity thus given to women to demonstrate the high character of the work of which they have shown themselves to be capable in dentistry. It is to this end that their best energies should be concentrated and their enthusiasm evoked. Papers, clinical material, and exhibits should be promptly completed and sent in for official record, so that the golden opportunity which the congress presents may result, as it should, to their advantage.

THE EXEMPTION OF DENTISTS FROM JURY DUTY.

THE efforts being made in certain states to secure exemption of dentists from jury duty constitute a movement in the right direction, and one in which dentists in all sections should actively interest themselves. The basis upon which exemption of physicians from jury duty is secured is the prior right of the patient to medical professional services for the conservation of life and relief of suffering. Equity should permit an individual to demand and receive the services of his dentist at all times on the same basis of prior right.

Several of the states have passed laws exempting dentists from jury duty, Wyoming's law in this respect dating from 1885. Such laws are, however, far from being general; but with the precedents already established it would seem that a little active and judicious effort would secure their enactment throughout the entire country.

BIBLIOGRAPHICAL.

DENTAL PATHOLOGY AND DENTAL MEDICINE. Containing all the most Noteworthy Points of Interest to the Dental Student. By GEORGE W. WARREN, D.D.S., Chief of Clinical Staff, Pennsylvania College of Dental Surgery, Philadelphia. Second edition, illustrated. Philadelphia, P. Blakiston, Sons & Co. Price, cloth, \$1.00.

This book is No. 13 of the Blakiston Quiz Compends, which series we have favorably noticed in a former issue. The present edition of Dr. Warren's book is an admirable condensation of a vast amount of valuable material in the field of dental pathology and dental medi-

cine. The salient features have been well selected and clearly expressed. An intelligent epitome of any subject is always an acceptable aid to the college student, as it serves the purpose of an introduction to the study of the larger text-books. The present work will admirably fulfill such a purpose. The book is remarkably free from errors, though we note, page 81, under "Liquefied Nitrous Oxide," the following: "The most convenient form for use is the liquefied gas, it being liquefied and solidified under intense cold and great pressure (50 atmospheres, or 750 pounds pressure). It is then secured in strong iron cylinders," etc. This is somewhat misleading, as in practice cold is not used in the process of condensing the gas into cylinders, which might be inferable from the sentence quoted. Also the sentence, "Nitrous oxide gas supports combustion with nearly the same promptness as oxygen," needs qualification, and a better word than promptness to express the facility with which N_2O supports combustion. The book is fully up to the present state of knowledge in its field, and cannot fail to be useful for the student.

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA FOR 1892. Third series, volume the fourteenth.

This volume contains a list of the officers, standing committees, and fellows of the college, as well as the papers read before the college from January, 1892, to December, 1892, inclusive. Of these, there are four reports upon Cases of Acromegaly by several authors, a report upon Certain Indian Skulls from Burial Mounds in Missouri, Illinois, and Wisconsin, by Dr. D. G. Brinton, and a valuable paper upon Obscure Forms of Gout, by Dr. Dalles, which have a dental interest.

HISTORY OF THE LIFE OF D. HAYES AGNEW, M.D., LL.D. By J. HOWE ADAMS, M.D. With fourteen full-page portraits and other illustrations. Royal octavo, 376 pages, extra cloth, beveled edges, \$2.50 net; half-morocco, gilt top, \$3.50 net. Sold only by subscription. Philadelphia, The F. A. Davis Co., publishers.

This biography leaves nothing to be desired in the way of fullness. If criticism were called for upon this point, it might be said that some of the minor details might have been omitted and the work strengthened thereby. Dr. Agnew's life was important not only as to the work which he accomplished, but as to the method by which his results were achieved. This latter phase is clearly shown in Dr. Adams's history, and it is this, after all, which is the real point of interest in the book, and to which the incidents of the history stand related as illustrative examples.

Dr. Agnew, it may be truly said, was within his range of action a

great man, and his greatness was the outgrowth of his sterling elements of character as much as his special qualifications as an anatomist or genius as a surgeon and teacher, though it was the combination of these which will always make the assertion that he was a great man easily defensible.

The reader is helped and inspired by the perusal of such a book, especially when presented in such readable form.

PSYCHOPATHIA SEXUALIS, WITH ESPECIAL REFERENCE TO CONTRARY SEXUAL INSTINCT. A Medico-Legal Study. By Dr. R. VON KRAFFT-EBING, Professor of Psychiatry and Neurology, University of Vienna. Authorized translation of the seventh, enlarged and revised, German edition. By CHARLES GILBERT CHADDOCK, M.D., Professor of Nervous and Mental Diseases, Marion-Sims College of Medicine, St. Louis, etc. Royal octavo, 436 pages, extra cloth, \$3.00 net; sheep, \$4.00 net. Sold only by subscription. Philadelphia, The F. A. Davis Company, publishers.

Krafft-Ebing's work, the seventh edition of which this is a translation, has for a number of years been a standard authority within the limits of its scope in the field of perverted sexuality. The work is treated under five sections: Psychology of the Sexual Life, Physiology, General Pathology, Special Pathology, and Pathological Sexuality in its Legal Aspects. It is a work which should be understandingly read by every man whose interests are along the lines of physical and mental health.

The work of translation is admirably done, and the text enriched by the record of special cases and the views and practical experience of the translator.

OBITUARY.

WALTER WEBB ALLPORT, M.D., D.D.S.

DR ALLPORT died at his residence, No. 69 Maple street, Chicago, at 1.30 A.M., Tuesday, March 21, 1893. He had been ill for about five weeks from erysipelas, induced primarily by irritation from a particle of foreign matter which lodged in his eye. His general condition had been somewhat better until two days before his death, and his physicians entertained some hope of his recovery, but meningitis supervened and rapidly terminated his career.

Dr. Walter Webb Allport was born at Lorain, Jefferson county, N. Y., in June, 1824. He was of English descent, and Sir James Allport, one of the greatest railroad men in England, and Dean Allport were his cousins. In 1844 he entered the office of Professor Amasa Trowbridge, at Watertown, to study medicine. In 1846 he determined to devote his attention to dentistry, and in 1853 entered the New York Dental College in the double capacity of student and demonstrator. He graduated from that institution in 1853, re-

moved to Chicago in 1854, and practiced his profession there ever since. He married Miss Sarah Maria Haddock, at Watertown, in 1847.

In 1858 Dr. Allport was elected president of the Western Dental Society; in 1860 he was elected the first chairman of the American Dental Association; in 1865 he was elected president of the American Dental Convention; and in 1886 he was elected president of the American Dental Association. In 1881 Rush Medical College conferred on him the honorary degree of M.D., and for many years he was Emeritus Professor of Dental Surgery in that institution and in the Chicago Dental College. He was the means of creating the dental section in the Ninth International Medical Congress, which met in Washington in 1887, and was made vice-president of the section. He was one of the organizers of the Chicago Microscopical Society, and for a long while its president. He was largely instrumental in the organization of the American Dental Association, and in projecting the World's Columbian Dental Congress, of which it was confidently expected that he would be the president. He was also for two years editor of the *People's Dental Journal*.

Dr. Allport was an accepted authority upon all subjects connected with dentistry, and he enjoyed the honor of having been the first dentist in the world to take advantage of the cohesive properties of gold for the purpose of restoring the front teeth to their original form when large portions have been lost by decay. This interesting fact is established by the report of a society meeting published in the *New York Dental Recorder* in 1856.

He was a member of Grace Episcopal Church, and was once a Mason, but he belonged to no club and no secret order.

Dr. Allport possessed a striking individuality, and the successes which he achieved were the direct result of those elements of character which so strongly distinguished him. The following sentences from the *Dental Review*, written by a life-long friend and enthusiastic admirer, are quoted because they present the view of his character which those who knew him best will recognize as a most fitting tribute to his memory, and at the same time a truthful estimate of a character which has at all times shed luster upon American dentistry:

"As an individual, Dr. Allport will long be remembered by those who had the honor of his acquaintance, on account of his many striking characteristics. He was commanding in appearance, dignified in bearing, and at all times perfectly poised and polite. He was the embodiment of elegance, whether speaking in a dental society or attending to patients in his office. He was a friend to the friendless at all times; a man warm in his attachments, tender in his sympathies, and fearless as a lion in his convictions. In ability he was a giant. He was the peer of any man, living or dead, as an operator; and his hand never lost its cunning up to the time of his last illness. Some of the very latest work he did will stand for long as a monument to his manipulation.

"And he was unassuming. This man, who claimed the confidence and patronage of the highest people of rank and intellect, never once presumed on his position to belittle any one. He stooped with winning grace to take by the hand the lowliest, humblest, youngest member of the profession, and when he stood erect again he raised the young man with him. From his presence there always gleamed a gem,—the precious pearl of modesty. While he had the magnificent courage to contend to the bitter end for what he believed to be right, he also possessed the sublime manhood

to admit his fault when he found himself in the wrong. He was strong enough to yield.

"He had his faults, and he made mistakes; but this is only saying that he was human. We who have our faults, and who make mistakes, feel closer drawn to him because he was not perfect. One of his greatest errors gave a touching phase to his life. He wrought more for posterity than for himself, and in disregard to the entreaties of friends and relatives, he persistently preserved the proceeds of his lifetime of labor for those he loved, instead of enriching with it his own existence."

He leaves to survive him his widow and three sons, two of whom, Frank and Walter H., are practicing physicians.

DR. FREDERICK ARTHUR LEVY.

DIED, at Orange, N. J., March 21, 1893, of Bright's disease, FREDERICK ARTHUR LEVY, D.D.S., aged forty-two years.

Dr. Levy was born in Richmond, Va., forty-two years ago. His boyhood was spent there, and later he was sent to the Mobile College, Alabama. Coming north in the early '70's, he entered the dental office of Dr. E. Parmly Brown, staying there for a short time. He matriculated at the old Baltimore Dental College, graduated in 1874, and commenced to practice in Orange in 1875, entering into partnership with Dr. William P. Richards. This lasted until four years ago. Dr. Levy was one of the foremost men in the State society, in the local society, and on the State Board of Examiners. He was chairman of the legislative committee for eight years, one of the most important committees in the cause of dental education in New Jersey. He gave freely of his time and money, and exacted the same with his *confrères* on the same committee. To him, in a great measure, is due the passage of the New Jersey law and its rigid enforcement. Every year the complexion of the legislature was scanned, and arrangements were at once made to defeat any attempt to render void any of the provisions of the law. He labored earnestly for the World's Columbian Dental Congress in its infancy, and felt keenly when New Jersey was deprived of its share in first originating it.

In matters pertaining to the workings of the society he was a most wise counsellor, very shrewd and penetrating as to what would be the ultimate effects of all measures that were originated. His words were always listened to with respect, and, like all men of strong character, he was a true friend and a good enemy, always outspoken. The dental societies of the State, as well as the profession in general, will greatly miss his counsels and presence.

Dr. Levy was married, in 1880, to Miss H. E. Palmer, of Orange, N. J., who has been dead for a number of years; their only child, a daughter of thirteen, survives them.

The interment was in Rosedale Cemetery, Orange, alongside his wife, March 23, the officers of the state and local societies and the Board of Examiners acting as pall-bearers.

C. A. M.

The Central Dental Association of Northern New Jersey passed the following resolution at its last meeting:

WHEREAS, in the death of Frederick Arthur Levy, D.D.S., our associate and valued member of thirteen years' standing of the Central Dental Association of Northern New Jersey, the society has lost one of its most worthy

and honored members, a man of sterling professional feeling and generous impulses toward his friends and love for the advancement of this society; therefore be it

Resolved, That the above expression of our regard and regret be placed upon the minutes of our society, a copy forwarded to the leading dental journals for publication, and to his surviving relatives.

CHARLES A. MEEKER, D.D.S., }
 GEORGE E. ADAMS, D.D.S., } *Committee.*
 WILLIAM L. FISH, }

At a special meeting of the New Jersey State Dental Society, the following memorial and resolutions were adopted:

WHEREAS, in the death of our esteemed associate, Frederick A. Levy, the New Jersey State Dental Society has lost one of its most worthy and honored members, full of generous impulses. Kindly professional feeling was foremost with those who labored to advance the profession by filling its ranks with honorable, capable men. He was a devoted professional brother, sociable, kind, and charitable to an eminent degree; therefore be it

Resolved, That we bow to the will of Almighty God, and yet desire to emphasize our grief in the death of our professional brother, and to bear testimony of his abilities and self-sacrificing spirit in the advancement of his profession; also,

Resolved, That a copy of these resolutions be spread upon the minutes of our society, and that a copy be sent to the dental journals for publication.

W. F. HOLBROOK, }
 R. M. SANGER, } *Committee.*
 J. A. OSMUN, }

DR. JAMES HOOPER.

DIED, at Aspen, Colorado, March 28, 1893, Dr. JAMES HOOPER, in the eighty-fifth year of his age.

Dr. Hooper was long a well-known dentist in Baltimore, Md. He was born at Annapolis, in that state, December 21, 1808. He was descended from an old family of Hoopers, whose names are mentioned in our early revolutionary history. His father was connected with the United States commissary department in the war of 1812.

Early in life Dr. Hooper studied medicine, and followed the practice of that profession for some time, but turned his attention to dentistry as more congenial to his taste, and established a practice in Baltimore which extended over a long period, during which he made many friends, both in and out of the profession. He went to Colorado in 1889, and has resided with his nephews at Aspen since that time. He was a lifelong member of the Methodist church. His funeral took place at Aspen on the 31st of March.

DR. E. NATHAN HARRIS.

DIED, at Calais, Maine, March 12, 1893, of Bright's disease, E. NATHAN HARRIS, D.D.S., in the sixty-third year of his age.

Dr. Harris was born in Reading, Mass., January 24, 1831. He graduated at the Baltimore College of Dental Surgery in 1854, and commenced practice in Calais, Maine, the same year, afterward removing to Boston, where he practiced for thirty-two years and until his death. He was for many years a member of the American Academy of Dental Science, of which he was secretary. Dr. Harris was a genial, kind-hearted gentleman, devoted to his profession, and a man highly respected by a large circle of friends for his sterling qualities. He leaves to survive him two sons and a daughter.

PERISCOPE.

PATENT MEDICINES IN GERMANY.—The manner in which Germany treats the patent-medicine trade is exemplified in the following, translated from *Der ärztliche Praktiker*, December 1, 1892:

"PUBLIC NOTICE.

"In the daily press Mrs. — is advertising her *skin tonic* as a remedy for various diseases of the skin.

"This secret nostrum consists of a solution of chlorid of mercury (sublimite) in water, with a little glycerin, and is slightly perfumed. It is sold in bottles containing 210 cubic centimeters, at the price of 11 marks (\$2 75), while the real value of the contents of a bottle is about 5 pfennige (1¼ cents).

"The above is hereby made known as a warning to the public.

"BERLIN, November 14, 1892.

(Signed)

"FREIHERR VON RICHTHOFEN,
"President of the Police Department."

AFTER THE NOSTRUMS.—Senator Thomas, of West Philadelphia, has introduced a bill in the Pennsylvania legislature requiring proprietors to print on their labels the exact formula of their preparations. The bill has passed the second reading, and some uneasiness is expressed by the Philadelphia proprietors in consequence.

Coming nearer home, two bills of a similar nature have been introduced in the assembly of this state [New York].

The first of these bills is an act to confer upon the State Board of Health the power to analyze such compounds. It authorizes and requires the board, upon receiving a fee of fifty dollars for such service, to cause an examination and analysis to be made by a practical chemist of any drug, medicine, or mixture of drugs, herbs, or medicines commonly known as patent or proprietary medicines, after which the State Board of Health must ascertain and determine whether the use of such medicine may or may not endanger the public health. The bill furthermore declares that it shall not be lawful to sell or offer for sale any such drug, medicine, or mixture not prescribed by a regular physician, unless the same shall have been so examined and approved and certified in writing by the state board as not dangerous to the public health.

The second bill is in the form of an amendment to Section 407 of the penal code, and makes it a misdemeanor to offer for sale or to sell any patent or proprietary medicine, not prescribed by a regular physician, without the examination and written approval of the State Board of Health.

Neither of the two latter bills can reasonably be expected to pass; but the movement to abolish secrecy rests upon a much better foundation.—*Druggists Circular*.

CINNAMON AS AN ANTISEPTIC.—"No living germ of disease can resist the antiseptic power of essence of cinnamon for more than a few hours," is the conclusion announced by M. Chamberland as the result of prolonged research and experiment in M. Pasteur's laboratory. It is said to destroy microbes as effectively, if not as rapidly, as corrosive sublimate. Even the scent of it is fatal to microbes, and M. Chamberland says a decoction of cinnamon should be taken freely by persons living in places affected by typhoid or cholera.—*Scientific American*.

COCAIN REACTION.—To the cocain, in a small porcelain dish, add 1 c.cm. of nitric acid (sp. gr. 1.4), and evaporate to dryness on a water-bath.

To the cold residue add one drop of a solution of potassium hydroxid in amyl alcohol. On heating, an intense violet coloration is perceptible, which does not form in the cold. Atropin, treated in the same manner, shows this violet coloration in the cold, which, however, disappears on warming.—A. KUBORNE, *Pharm. Zeitung*, 1892, p. 457.

HOW TO TREAT ACUTE COCAIN-INTOXICATION.—M. Charles Elroy, in the *Revue de Clinique*, indicates the proper procedure in cases of cocain-poisoning :

Your first duty is to prevent syncope, afterward to combat respiratory and cardiac collapse. The therapeutic means of doing this are unfortunately very few. At the very beginning place the patient in a perfectly horizontal position, which will diminish the force of the syncopal condition. Sprinkle ice-water over the face, and to prevent convulsions envelop the body in cloths wrung out of cold water.

If asphyxia threatens, practice flagellations with wet towels, massage, artificial respiration.

Against tetanization of the respiratory muscles give inhalations of chloroform.

Where there is great pallor, provoke vaso-dilatation, modify the arterial pressure, and diminish the encumberment of the central circulation, by the administration of amyl nitrite (by inhalation).

If these means prove ineffectual, and deglutition is impossible, give hypodermic injections of caffein and of sulfuric ether (15, 30, even 45 minims).

In a word, bend your efforts toward moderation of reflex excitability of the nervous system, sustain the heart, and re-establish the equilibrium of the blood-pressure. The treatment of acute cocain-intoxication is particularly and above all a case for arterial medication.

Commenting on the foregoing, M. Chouppe (*Bulletin Medical*) counsels in addition the use of hypodermic injections of morphin. These should be given only in the very outset, however, and should be only sufficiently large to produce the physiological effects of the drug, say from one-half to five-eighths of a grain.—*Nat. Drug.*

COCAIN.—M. Bignon (*Bull. de Therap.*) formulates the results of his experimental researches as follows :

1.—Cocain parts with its valuable anesthetic properties in a decidedly acid solution.

2.—In such solutions its power as an anesthetic is not destroyed, but becomes latent.

3.—The anesthetic property is fully restored by simply neutralizing the acid.

4.—All the mineral and organic acids used in the experiments operated in the above manner.

5.—The anesthetic energy of cocain attains its maximum when, all its acid having been neutralized, the alkaloid is held in suspension by a slightly alkaline liquid. This preparation the author calls milk of cocain.

6.—Milk of cocain is obtained by precipitating the hydrochlorate or other salt of cocain by a slight excess of carbonate of soda. The bicarbonate does not act so well.

7.—Most of the cocain salts, especially the hydrochlorate, retain an appreciable quantity of acid; hence their solutions do not possess the full anesthetic potency of the alkaloid; i.e., a portion of the same remains latent.

8.—The anesthetic power of cocain salts varies greatly in different cases. Some crystallized hydrochlorates, though perfectly pure, are so acid that ten centigrams, simply dissolved in water, are no more efficacious than half the quantity when neutralized and made into milk of cocain.

9.—The surgeon's first care, therefore, before using a solution of any cocain salt, should be to assure himself of its neutrality; this can only be obtained at a sacrifice of limpidity; it is accompanied by some degree of opalescence.

10.—The difference in the quantities required for production of anesthesia is in most cases explainable by the difference in the acidity of the solutions employed.

11.—The effect of subcutaneous injections of milk of cocain on the human subject has yet to be ascertained. Experiments on dogs have given encouraging results in this direction, but the author has not succeeded so far in localizing the action. Milk of cocain should always be prepared extemporaneously, as by keeping the alkaloid is thrown down from the solutions, and much of their efficacy is lost — *Medical and Surgical Reporter*.

COCAIN POISONING.—Dr. A. R. Baker, of Cleveland, in a paper read before the N. E. Ohio Union Medical Association, reported a case of cocain poisoning with very alarming symptoms, produced by eight drops of a six per cent. solution in the eye. Ten fatal cases were also read, indicating that a fatal dose is much smaller than generally thought, especially if the drug be used about the mucous membranes of the mouth, nose, or throat, or by hypodermic injection.—*Medical Standard*.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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- Ackermann (E.)** *Befestigung von Stifzähnen mit Holzhülsen*. Deutsche Monatschr. f. Zahnh., Leipz., 1893, xi, 47-54.—**Ashby (H.)** The influence of dentition on the general health. Brit. J. Dent. Sc., Lond., 1893, xxxvi, 157-163.—**Barrett (W. C.)** The condition of the dentine in pulpless teeth. Dental Reg., Cincin., 1893, xlvii, 115-124.—**von Bergmann (E.)** Zur Casuistik der arthrogenen Kieferklemme. Arch. f. klin. Chir., Berl., 1892-3, xlv, 664-673.—**Birkett (H. S.)** Empyæmia of the antrum of Highmore. Montreal M. J., 1892-3, xxi, 650-662.—**Blackstone (W. R.)** Treatment of difficult canals in molars. Dental Cosmos, Phila., 1893, xxxv, 210-212.—**Block (H.)** Mastication in man. *Ibid.*: 177-192.—**Bödecker (C. F. W.)** Die Herbst'sche Methode der Pulpa-Behandlung. [*Transl. from:* Dental Cosmos.] Cor.-Bl. f. Zahnärzte, Berl., 1893, xxii, 25-39.—Un canal pulpaire anormal. [*Transl. from:* Dental Pract.] Rev. odont., Par., 1893, xii, 73-75.—**Camption (G. G.)** Notes on some of the specimens in the recent B. D. A. Museum. Brit. J. Dent. Sc., Lond., 1893, xxxvi, 251-258.—**Caradec.** Y a-t-il des accidents de dentition chez les enfants? Art dentaire, Par., 1893, xxxvii, 42-47.—**Carlson (H.)** Aethylchlorid. Cor.-Bl. f. Zahnärzte, Berl., 1893, xxii, 1-4.—**Case (C. S.)** Expansion of the dental arch. Dental Rev., Chicago, 1893, vii, 207-230, 1 pl.—**Cheever (D. W.)** *Analæsthetics*. Boston M. & S. J., 1893, cxxviii, 177-182.—**Clifford (E. L.)** The care of the teeth during the eruptive period. Dental Rev., Chicago, 1893, vii, 192-201.—**Dickinson (W. P.)** Conservative treatment of the dental pulp. *Ibid.*: 173-179.—**Edgelow (P.)** *Analæsthetics*. Brit. J. Dent. Sc., Lond., 1893, xxxvi, 164; 206.—**Eckert (Hermann.)** [1829-1892.] Nekrolog. Beibl. z. Deutsch. Monatschr. f. Zahnh., Leipz., 1893, Feb. 46.—**Gallie (D. M.)** Treatment of deciduous teeth and first permanent molar. Dental Rev., Chicago, 1893, vii, 201-205.—**Gradle (H.)** Personal experience in empyæmia of the maxillary sinus. Dental Reg., Cincin., 1893

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH, 1893.

- March 7.—No. 492,830, to ARTHUR E. PECK. Dental plugger.
 March 14.—No. 493,289, to PECK & ALLSHOUSE. Angle attachment.
 " " No. 493,318, to J. M. TWILLEY. Artificial teeth.
 " " No. 493,379, to A. P. GOULD. Chair.
 " " No. 493,431, to J. KELLER. Dental motor.
 " " No. 493,528, to W. A. SPALDING. Tooth-powder box.
 March 21.—No. 493,723, to W. P. HORTON, JR. Obundong device.
 " " No. 493,800, to JOHN R. WATSON. Dental plate.
 " " No. 493,843, to J. A. A. SCHOONDERMARK. Dental plate.
 " " No. 493,846, to WEBER & HAMPEL. Dental drill.
 " " No. 493,893, to N. MORGAN. Disk-holder.
 " " No. 494,065, to G. A. JUTERBOCK. Dental plate.
 March 28.—No. 494,227, to F. J. RICHARDS. Dental plugger.
 " " No. 494,393, to J. C. STAPLETON. Dental plate.

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ORIGINAL COMMUNICATIONS.

MASTICATION IN MAN.

BY HANS BLOCK, DRESDEN, GERMANY.

(Concluded from page 349.)

MASTICATORY MOVEMENTS.

HAVING thus far arrived at what ought to be a clear idea of the masticatory apparatus in its state of rest, we are now prepared to study how it comes into action.

"As long as the teeth occlude they resist efforts to move the jaw laterally, they interlock so as to hold one another firmly," says Dr. Dean. The jaw cannot even be brought forward without first pressing it downward (which is an interruption of the occlusion), because the front teeth of the upper jaw establishing a transverse horizontal occlusion prevent the lower ones from moving anteriorly.

So we see that all movements of the jaw depend in the first place upon its previous depression; unless the jaw be first depressed, not the slightest anterior, lateral, or rotary movement is possible. This confirms what the study of the muscles showed us: that the main force is exerted from below upward; that is, raising the jaw results in the greatest pressure on the morsal surfaces, as in motion in other directions (directly forward or sideways) much less force can be exerted.

It is plain that mastication requires that two grinding-surfaces, as large as possible, be brought into contact as closely as possible by sufficient pressure.

The contact of normal occlusion, as we have already seen, is the most immediate, but not the fullest one possible, as the arches overlap both inward and outward, those parts which overhang being naturally excluded from contact.

To correct this and to achieve broad contact, the lower jaw, as the only part which can be moved, must be pushed laterally outward, so as to bring the teeth face to face.

The outward excursion is, however, possible only on one side at a

time, and while one side profits in getting a broad contact, the other side loses nearly all antagonism.

As a consequence, "only one side can be used at the same instant" for mastication, as Dr. Bonwill says.

This, however, does not mean that man is one-sided in his masticatory work, for healthy individuals will by the instinctive law that all organs require exercise for their health be induced to employ each half of the mouth alternately.

Dr. Galippe, of France, supports this view by stating: "A person having all the teeth, devoid of pain from pressure, masticates on the right and left sides alternately. It is not the same with individuals who have carious teeth. By a reflex action, mastication is made on the side where the pressure is but little or not at all painful. Beginning in a passing accident, the habit may become fixed; but in the normal state mastication is made alternately on both sides. There is naturally some division of the work. The maxillaries operate simultaneously only on soft substances which offer slight resistance."

The latter observation is also correct, but when both sides crush food simultaneously, the trituration is done merely by the force of occlusion, and not by real mastication, which in man requires rotary movements, and can engage only one side of the mouth at a time.

But mastication requires not only the broadest, but also the closest, contact, and for the latter end the broad contact has to be abandoned to bring the jaw back in the next movement to the occluding position which alone can give the final closest and fullest pressure.

The regular movements of mastication are comprised, therefore, in three stages:

1. To drop the jaw downward and outward, to one side.
2. To bring it upward and outward on this side in the antagonizing position, to get the largest and most extensive surface available for the exertion of the preliminary pressure.
3. To pull the jaw laterally back into the occluding position for the exertion of a still closer and higher though less extensive final pressure.

This shows that the motion of mastication requires hardly any forward excursions, and any one can convince himself that it is quite easy for him to grind food while his finger is pressed on the edge of the upper centrals in such a manner as to prevent the lower jaw from coming forward.

Nevertheless, as a rule, the jaw in grinding slides a little forward too, so as to have more opportunity for the exercise of pressure, and to give a rounded effect to the movements, whereby time is saved.

This circle of movements is called the rotary grinding process, which always involves only one side of the mouth at a time, as before noted.

One fact is of importance. It is impossible to grind food on one side when the jaw is depressed to the other side and raised from the interior of that side outwardly; for instance, food cannot be ground on the right side when the jaw is first dropped to the left and then raised upward and outward to the right side. The pressure must hence always come from the outside of the half on which the food is placed by the tongue, or it must at least, and occasionally does, come straight from below as in occlusion.

Dr. Starr confirms this by saying, "The principal force of occlu-

sion is exerted from without inwardly. The teeth strike in exactly the direction in which the greatest resistance is found in both jaws."

Dr. Black, Dr. Davenport, and an innumerable host of other eminent dental authorities have made the remark that the human teeth are fitted for tearing. It would be interesting to see this demonstrated by placing a napkin in a human mouth and exposing it to the tearing movements. These movements are only possible in dentures which have a carnivorous outfit. No human being can tear anything with his teeth.

Dr. I. B. Davenport says, also, in one of his essays, "The masticating surfaces slide upon and into each other, constituting a self-sharpening machine." Let us examine this. Supposing the sharpening really takes place, then it must be conceded that those teeth which lose their antagonists are not sharpened any longer, and must become blunt, a circumstance which hardly has been on record yet. It has also to be proven that the enamel is either so thick that even by a lifetime's sharpening it can never be ground so far down that the dentine at last becomes exposed (provided such havoc is not brought about by caries), or else that it is constantly growing and replacing those layers which have been sharpened away. But the tissues of the teeth, it is taught, can never reproduce themselves. To say the morsal surfaces require constant sharpening would mean that either the teeth wear each other down (which they cannot do, as it is not the teeth that are ground, but the food) or that the normal food of man wears down the enamel. Let us see if the latter is possible.

According to Hoppe, the hardness of the human enamel ranges in the fifth class of Moh's scale (that is, as hard as apatite), and according to Kopetzky, it ranges even in the seventh class (quartz). Now, the hardest substance which man eats is salt, which, however, represents the second class only of this scale, and it is therefore impossible that the normal food of man could ever mechanically wear out the human enamel.

So we see that in fact the *normal* food of man does neither mechanically nor chemically attack the enamel, and hence there is no necessity for a sharpening of the teeth.

Somewhere else in his rich essay Dr. Davenport says, regarding the teeth, "Forces and resistances are evenly balanced." This is an admirable law, and if the doctor had recognized its full meaning he would have left aside the idea of the self-sharpening machine, because the oral apparatus is (like all works of nature) fitted for lifetime, and needs no repairs in healthy subjects. This law, like all basal truths, can be absorbed by higher laws, but never be refuted. The enamel would never be able "to balance" the invasive "forces" of the normal food (if there were any), as it has no other "resistive" power but its hardness, for it cannot reproduce itself nor can it continue its growth. Its density alone makes the enamel immune, and consequently healthy people have sound teeth, which are not worn down as long as they live.

Dr. T. Dwight Ingersoll said in 1888, "The self-sharpening, chisel-shaped teeth of rodents are continually supplied with new tooth-substance as fast as the cutting-edge is worn away. Nothing like it is known in the human family."

Now to return to our subject proper, two questions might be asked,

viz, *Why do the teeth have cusps and uneven surfaces? Could more uniform, safe, and rapid pressure not be exerted with smooth and even morsal surfaces?*

To this question we may answer,—

1. "The double crossing of the lines of division of the arches has the effect of binding the teeth into firmer contact in the arch.

2. "To afford the greatest amount of contact surface for the attrition of food."—*Dr. Davenport.*

3. "As the cusps wear down the lower jaw moves forward."—*Dr. Davenport.*

4. "Uneven surfaces cut and divide food better."—*Dr. Hazeltine.*

This does not mean (what point 2 says) that the active surface is enlarged, but that the food is placed at a disadvantage when it is pierced by cusps over other cusps into depressions.

A further argument would be the point of beauty, and a sufficient explanation is contained in the process of formation, or rather evolution, of the teeth.

It will be remembered that in former times the molars were called "double teeth," a name which is in one sense accurate, for two bicuspids put together give the unmistakable appearance of the molar, and so are the bicuspids a fusion of the cuspids. In a word, nature has "doubled" the supports to give more strength.

A seventh argument is that the cusps serve as guides or dowels during motions to bring the jaw always exactly to the proper place.

The other question is, *Why do the lower molars have only two roots, and not three, as the upper?*

To this we may reply,—

1. It is a general mechanical law that where two parts strike each other the fixed part has to be the larger, the movable part the smaller or lighter one, as for example in anvil and hammer. The lower molars belonging to the movable lower jaw, are therefore supplied with only two roots.

2. As for esthetic reasons the skull has to be tapering somewhat from vertex to base, so the lower jaw must appear a little smaller than the upper. The lower arch hence runs inside the upper, and the lower three molars are together four mm. or individually one and one-half to three mm. narrower (on each side of the jaw) bucco-lingually, but four mm. broader (mesio-distally) than the upper three molars. It being necessary to arrange corresponding to this contour of their crowns the roots of the lower three molars, so it is that in the lower jaw the crowns, which are broad but not wide or thick, are supported by two broad roots, and the additional root which has to support the width or thickness is only to be found in the upper three molars, which are wide or thick, but not broad.

3. A glance at the anatomical investment shows that all the lower molars got a compensation for the one root less which they have by the increase of strength which the lower jaw affords to them by its two ridges, the mylo-hyodian or internal oblique line on the inside and the external oblique line on the outside of the roots of the molars. Even apart from these ridges is it known that "the alveolar walls of the upper teeth are generally thinner than those of the lower," as Dr. Harris says.

Dr. Black also says upon this point, "In the lower jaw the sub-

stance of the bone is more compact and stronger than in the upper ; especially about the molar teeth, where the alveoli are in the substance of the body of the bone."

The investment is hence stronger for three reasons : The alveoli are generally stronger in the lower jaw, the bone is thickened by two ridges, and the roots are put down in the body of the bone itself.

4. On the other hand, it is evident that a special provision had to be made on the part of the upper molars against the vibrations and the pressure coming from the blows of mastication. We have seen that these blows come constantly in one direction only, and that is from without inwardly. This made it necessary to anchor the tooth by a special inner (lingual) root to prevent any displacement. So we find the axis of the upper lingual extra root just in line with the direction of the greatest force from the motions of mastication, and there can be no doubt that the third root has and answers the purpose of increasing the firmness of the upper teeth.

5. Moreover, the lower jaw or the moving part does not suffer so much from the concussions of mastication, as it can always slightly recede or rebound at the moment when the impact occurs, whereas the fixed upper jaw has no means to avoid or to diminish these shocks.

6. The upper molars had to be fastened in a more secure manner, as they uninterruptedly have "to work" against gravity, whereas the lower molars could not fall out of the jaw even if they were loose, because in their case the operation of gravity is reversed.

7. "The roots of the upper molars are round and slender, those of the lower are broad," says Dr. Parreidt. The disadvantage of the absence of the third root is therefore partly balanced by the stouter and more massive construction of the two roots which support the lower molars. Had these teeth been supplied with three roots, then a divergence in their direction would have been unavoidable, as it is a mechanical law that the best and safest foundation by three bases can only be afforded when they are placed in a (equilateral) triangular arrangement. To bring the third base in the same line as the other two would be a nearly useless, unpractical thing, for it is better to make (out of the same mass) two bases in one line instead of three in a line. Having ascertained this plain rule, we can easily understand why nature preferred to make (out of the same bulk of root-material) two thick roots in one (alveolar) line instead of three in a triangle, for, as we have seen, the arrangement of three in one line is out of the question. The arrangement of three roots in a triangle (as in the upper jaw) would, moreover, have involved the disadvantage for the lower jaw that in case of extraction fracture of the bone would have occurred much easier than it can occur from the extraction of a tooth with two hardly diverging roots which are arranged in a line. This may explain sufficiently why out of the same amount of root-substance these two roots were made which afford the same safety of anchorage, as they are slanted in the direction in which the greatest resistance is required.

The criteria which characterize the apparatus of mastication in man, in contradistinction to nearly all lower animals, may be collected together as follows :

1. The evidence of a certain coincidence in the development of the human teeth and brain, which are alike nourished by the common

carotid artery.—viz, the most rapid increase in the growth of the brain falls within the first seven years of childhood, at which age, simultaneously with the eruption of the first permanent teeth, the brain enters the stage of consolidation. At fourteen years the growth of the brain is nearly completed, and its further increase is restricted to the cerebellum, just as the denture is complete at fourteen years excepting the last posterior teeth, and by twenty-one years brain and denture reach the stage of full capacity and complete function. The development of the teeth is accompanied by marked physical disturbances, that of the brain by psychical. That the seventh year represents the really correct time of normal beginning of second dentition is also supported by the following authorities. Dr. Patrick, who consulted about seven of the best dental anatomies, says in his paper (*DENTAL COSMOS*, August, 1886), "The first of the permanent set appears at seven years." John Tomes, in his "*System of Dental Surgery*," states that at the age of six years and five months the first permanent molars have cut the gum, and that at seven years they are on a level with the temporary teeth. Erasmus Wilson, in his "*System of Human Anatomy*" (1858), says, "The period of appearance for the first permanent molar is at six and a half years,"—that is, during the seventh year.

2. The similarity in form and between corresponding diameters of heart and maxillary cavity, though under the exciting influences of modern life the heart rarely conforms with the standard heart, and this seems to be reflected in the shape of the jaw, which also rarely harmonizes with the jaw of the "standard face."

3. The semi-circular curvature of the front part of the arches, which seems to be indicative of the shape of the trunk. In this respect it would be interesting to investigate whether there is any parallelism between the dental and the pectoral and pelvic arches in the different species and classes of animals.

4. The tripod arrangement of the jaw and the conspicuous tendency to constant relations between jaw and skull.

5. The relative smallness of the interstices of the teeth.

6. The unfitness of the human dental organs for attack or defence.

7. The roundness of the cusps and absence of sectorials.

8. The individuality of the teeth in expression of temperament, character, race, morbidity, etc.

9. The approximal contact. Though some naturalists assert that the *Anoplotherium*, a fossil pachyderm, possesses in common with man an uninterrupted arch of teeth, as long as dentists have not indorsed this as a fact it is questionable if in this animal's denture there is really approximal contact all round the arch, as in man.

10. The overbite of the incisors. In other animals the incisors bite edge to edge.

11. The curved plane of articulation and the mesial slant of all teeth.

12. The conformity of all teeth in length and symmetrical arrangement.

13. The remarkable translucency, owing to the high degree of organic crystallization.

14. The variableness of the rugæ of the palate.

15. "In the upper permanent molars (and the second deciduous

molars, both above and below) the 'bicuspid' cusp (*i.e.*, the antero-palatal) tends to extend obliquely across the tooth to join a corresponding prolongation of the 'molar' cusp (*i.e.*, the postero-buccal cusp). This forms a ridge which is characteristic of the human molar."—*Dr. Allen.*

Having studied now the statical and dynamical relations of mastication in man in all particulars, we must confess that it exhibits a marvelous correspondence, free from any incongruities whatever, and this gives weight to the conclusion that the human denture, which represents the highest form in the organic scale, is manifestly designed for effectiveness and health, and not for irregularity and decay. And yet our literature teaches only too plainly that all civilized nations are far remote from this standard of oral health. Where else can the fault for this misery be found if not in dietetic incompatibilities? We see that wherever civilization is followed by omnivorian habits, caries of the teeth becomes the inseparable companion of man. Why has no attention been paid to this fact, although Plutarch and Pythagoras emphasized it so highly? Why has mastication in man not received the same care by our modern naturalists which it received two millenniums ago by those and many other distinguished philosophers? Why has this study, which forms the main key to the full apprehension of the true natural dietetic character of man, not been made the mainspring of all biological researches? As far as science at this moment has progressed, no one can prove that man is an omnivor, but everybody can demonstrate the terrible havoc through diseases among civilized races, the cause of which is chiefly to be sought for in the dietetic outrage of omnivorism.

To complete the cycle of our conclusions on the human apparatus of mastication, we cannot forbear to state that hardly in the entire organic world is there so substantial an object to show, in all particulars, the ratio between use and development. How could this be if elasticity of adaptation were not an inherent quality of all organic forces? But it may be declared that although it is plain that work specializes organs, it is evident from what has been said that the legitimate work of the human masticatory organs (muscles and teeth) is energetic exercise (*i.e.*, a food which requires real mastication), and hence that a distinct design seems to govern the direction of development. Design becomes also apparent from the periodicity of growth which we witnessed in the sevens of eruption, and furthermore in the well-balanced arrangement of equal distances in the skull. But does that require special arbitrary creative injunctions, or can it not just as well be the outcome of one grand original aim, of which evolution is only a subordinate process? In every physiologically healthy (*i.e.*, harmonious) construction, demand and supply counterbalance each other, for antagonists act through mutual expenditure. Waste counteracts nutrition, development in one direction is always coextensive with development in the other two dimensions,—a fourth dimension having not yet been discovered,—elongation precedes eruption, impingement produces absorption, loss of antagonism favors displacement. Everywhere in the vital domain, and especially in dental anatomy, do we find retroactive influences. Changes of environment and adaptation to sustain the highest effectiveness are synchronous everywhere. Impairment of strength means injury of contour, decrease of activity is

associated with structural diminution, strain is opposed by reinforcement, pressure excites counter-pressure, stimuli encourage growth. Matter and force constantly compensate each other. Impact influences structure and shape, use determines the form and health. Nature works all through in proportion, and balances and operates toward best adjustment. Extraction leads to contraction, inactivity reduces to rudimentality. All forces influence each other, yet not without a plan, the focusing of which tends manifestly to the uniform accordance of one great aim, and that is—perfection. We found also universality of rhythmical movement in all functions; we found it in the oscillation of the single teeth at their contact point, and found it in the rotation of the entire denture, just as we found it in the periodicity of eruption. However great though this reciprocity between physical and organic forces is, it varies in different individuals, for these forces are constantly (though to many perhaps not perceptibly) controlled,—*i.e.*, antagonized by the psychic forces which are called instinct, conscience, and will.

Taken as a whole, the human masticatory apparatus exemplifies that force without equilibrium, and beauty without effectiveness, is a farce. It exemplifies also the truth of the theory of evolution, the tenor of which may be expressed in the two theses: The multitude of bionts is the result of gradual development, higher forms always following the lower ones; and, External influences—*i.e.*, mechanical causes, etc.—have been instrumental in bringing about this development.

We could arrive at lofty conceptions if we should pass to an inquiry into the origin of these causes, but that would transcend the limits of our subject. As Kant declared that metaphysical knowledge begins with the understanding of the supernatural, so we may stop where this understanding would have to begin, for mastication in man is a strictly physical object, and from its physical aspect the question has been discussed here more fully than ever before. When in this work errors of previous authors were exposed, it was done for the purpose of getting at the truth, and the reader will, no doubt, notice that all criticism has been made without reflecting upon many.

MANAGEMENT OF DENTAL PRACTICE.

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(Read before the New Orleans Odontological Society, April 12, 1893.)

ABOUT a year ago there appeared in the *International Dental Journal* (Feb., 1892) an article upon "The Management of Dental Practice," by Dr. Louis Jack, which excited so much interest that I feel warranted in giving to you my own views and experiences upon the subject, considering that this has been made a special study by me, and that, with exactly the same ends in view, Dr. Jack and I find the means for the obtaining of them so radically different.

A point to be considered, however, is the fact that the general conditions governing modes of life, and the customs of the people, differ greatly in various parts of the country, so that rules that may be profitably established in one city might prove a great failure in another.

If I were asked by a young man, fresh from college halls, to lay out a plan for him, based upon my own experience, upon which to conduct his practice, I would proceed as follows :

From time to time, as years go by, your practice will reach certain stages that will require certain modifications in your methods, and these will be considered in the chronological order in which they will appear.

We will, then, divide the subject to be treated into the following divisions :

1. Consideration of office and instruments.
2. The establishment of regular hours.
3. Employment of an assistant at the chair.
4. Engagement of an associate.
5. Employment of a secretary.
6. Problem of fees.

First, consideration of office and instruments.

In the early days of your practice, although your time will not all be filled, you must make it a habit to do whatever work is on hand, as expeditiously as possible ; that is, while no undue haste must be made, no unnecessary delays should be indulged in. For instance, if there is a certain amount of work to be done for a friendly patient, and you desire to indulge in a little conversation, for which there is supposed to be sufficient time, you should first do the work, and then if by chance the unexpected happens, and time runs short, the unnecessary conversation only is lost.

And so it must be in the laboratory. If on Monday morning you find a piece of work to be completed for Friday, you should put it through as rapidly as possible, irrespective of the time it is promised ; and any waiting should be done after it is finished, and not before.

This habit will soon become second nature, and in after-years you will find it a most valuable adjunct to the system which will have been evolved for the management of your extended practice.

Long before you have acquired a full practice, you will perceive the necessity for great system in the use of instruments of all kinds.

A study should be made of excavators, and finally a set of a limited number, hatchets and hoes, should be decided upon, with which any portion of any cavity can be reached. These should be divided into two classes by knurled handles, each occupying a drawer in an Allan bracket-table, and the handles numbered from 1 to 12.

Each drawer must be fitted with as many grooves as there are instruments, and neatly lined with plush. As each instrument is always returned to its own individual groove in the drawer, not a second of time is lost in looking for it ; a simple glance reveals the fact that all are in place, or that one or more are missing, and must be looked for ; and certainly the drawer with its highly polished instruments, so neatly arranged, presents a most pleasing appearance to those prying patients who take an interest in the cleanliness of everything, and take advantage of your back being turned, only for an instant, to satisfy their curiosity in that respect.

With engine-burs the same result must be attained. You will soon learn that cavities of certain classes and sizes can best be prepared with certain engine-burs. A limited number of regularly graded sizes of certain form ; should be selected with which any and all work

can be done. In this way the preparation of a cavity becomes mere routine work. As soon as it presents, its size and position suggest the instruments always used in similar cases. As the burs are systematically arranged in the rack drawer of the Allan table, and each one always returned to its individual place, again not one instant of time is lost in its selection.

The selection of gold-pluggers must also be made, and the system adopted will call for certain definite instruments to follow likewise certain definite others that were used for the preparation of the cavity.

Each of these should also occupy its own groove in a cabinet drawer, upon the same time-saving principle.

So with the amalgam-pluggers. They should be arranged in the same manner, and should be selected or devised with the idea that a certain cavity prepared with a certain-size bur could best be filled with a plugger to correspond. For instance, a fissure-cavity prepared with a No. 2 bur can be most expeditiously and satisfactorily filled with the amalgam instrument made to correspond to it, while the same instrument would cause a loss of time in the filling of a large crown cavity in a molar prepared with a No. 6 bur.

Another drawer in the cabinet should contain a block into which holes have been drilled, after the fashion of the manner in which engine-burs are kept in the depots. In this are kept several duplicates of all the excavators, burs, drills, and mounted disks used, systematically arranged, with the number of the instrument pasted at the side of each hole.

Whenever a bur or excavator requires renewing, it can be quickly done from the stock here ready at hand. Before the last one is taken out of any hole, a fresh supply is put in from the general stock on hand kept elsewhere.

And so on throughout the whole list of instruments. Extra hand-pieces for the engine, right-angles, mouth-mirrors, chisels, root-instruments, separators, etc., each should have its own individual location, and so never require searching for.

The convenient arrangement of your office can add greatly to the ease and expedition with which work can be accomplished and a large practice handled.

When a consulting-room becomes necessary, it should be furnished with its own complement of instruments for examinations, applications, etc., all as neatly arranged as are those in the operating-room. This room being used for extracting, the instruments for that purpose should be kept therein. It should adjoin and open into the laboratory, which will greatly facilitate all artificial work and regulating.

In the laboratory every convenience and labor- or time-saving device should be taken advantage of, and everything about the room kept in a neat and orderly manner.

With an office arranged as suggested, and everything about it and the work to be done systematized to the greatest degree, a practice can be handled and an amount of work can be satisfactorily performed that would be utterly impossible under any other circumstances.

Second, the establishment of regular hours.

If there is one point that I would endeavor to impress upon your mind, it is the necessity of being found always at your office during your regular hours.

During the early years of your practice the probabilities are that your time will not be always filled by patients, and sometimes there will be a great temptation to run out for a little while. But this should never be done, except in absolutely unavoidable instances.

There is no necessity for you to have an idle moment, no matter how few your patients, for looking after your instruments, making excavators, if need be, reading the journals, doing practice or experimental work in the laboratory, all this will keep you busy and out of mischief. In fact, I am sure a "live dentist" could find profitable employment in many ways if he had only half his time filled.

You should manage it so that all your outside business can be attended to before or after your office hours, or by correspondence.

Faithful work and strict attention to your office hours will in time result in a practice that will require all your energy and tact to meet. You will then begin to consider the setting aside of an hour for consultations, to avoid being interrupted during your work. But this point you will discover to be no easy one to decide. For if you decide upon a mid-day hour, which would naturally be most convenient for the majority of adults, it will be impossible for school-children to regard it; or if you take a late hour, say from four to five, which might prove very agreeable for yourself, you will find it very inconvenient for many ladies who are obliged to come down-town, or up, as the case may be, in the morning, and then it will only allow you a short time to devote to the operating for the school-children, which will probably prove insufficient.

Again, you will find that in this city, at least, where the distances are quite great, patients will not find it possible to confine themselves to a single hour for consultation. Nor do I honestly believe they do elsewhere. I am aware that there are dentists who claim that they do not allow interruptions, and only see these people during their consultation hours, but I have positively found some of them were not sincere, and do not see how the others can be, if they have a practice of any size. At any rate, if you follow my advice, you will not handicap yourself by any such rule, but will manage to see your people as they come, and with little delay. Many a time a patient who is undergoing a long sitting will be glad of the rest for one or two moments, while you run off to make an examination or change a wedge, but of course under these circumstances you must be expeditious. If you remain away ten or fifteen minutes, that is another and quite different affair, and one that will not be liked or tolerated.

Dr. Louis Jack's methods of notification are very systematic, but I cannot say that I approve of them. There is something about sending for a patient, whom one has not seen for several months, to return for further services, that I do not altogether relish, nor would I care to practice. I would suggest to you a method of reminding your patients which I greatly prefer. When you are about to dismiss a patient for a season, and you consider it necessary, give her a card which states that certain teeth should be examined at a certain time. In this way you do your full duty toward the patient, you will probably see her at the appointed time, and you have not done what is always unpleasant, and that is, sent for her. In case the patient desires to change her dentist,—which sometimes occurs, you know,—the advantage of this method over Dr. Jack's is apparent.

It would be well for you to use appointment-cards, always giving one properly filled out to the patient. This in itself impresses him with the importance of meeting it. Then if a little foot-note on it calls attention to the fact that timely notice must be given in case of the non-fulfillment, in order to avoid charges for loss of time, it at once causes to be recognized as a fact that, after all, it is your time that is valuable, and usually this will be appreciated. Of course it will not do to be too exacting, and if a patient fails to keep one appointment, without notification, out of a dozen or fifteen, all others being promptly met, and for the broken one gives a satisfactory reason, it would be well to overlook it. But there is a class of persons who would without any good cause allow a dentist to lose any amount of time, and to these persons particularly is this rule especially adapted. It will usually "bring them around," as it were.

Punctuality is something that is evidently contagious. Let a dentist never be on time himself, and it will be rare for a patient to be prompt; but let him be always ready to the minute, and his patients will usually be there for him. Very occasionally a half-hour or an hour will be thrown on your hands, and in that time a dozen and one little things, only waiting for the opportunity, may be accomplished.

In the matter of making appointments, Dr. Jack's methods and those which I would recommend are in striking contrast. While he only makes engagements (the first) by mail, I would suggest never to make an engagement without an examination. This should be done that the necessary time may be reserved. It would cause a waste of time that is not consistent with economic methods to reserve an hour for a patient whom you had not seen, and then find perhaps only a small cavity that required but fifteen or twenty minutes for the filling. And the same result would be produced were only a half-hour appointment given, and a full hour found to be needed. Very often, also, some preparatory work, such as wedging, is needed. Therefore it is that you should always insist upon an examination before the making of an appointment.

You will find that the use of examination blanks will cause a very great saving of time. One of the duties that I would suggest to you during the first few moments in the morning, before your earliest appointment, is the looking at your appointment-book, and learning just who are expected during the day, and what work is to be done, that you may see what is cut out for you during the day. To be ignorant as to who is to come until the patient is announced, and to know nothing of the character of the work expected to be done during that sitting until the patient is seated in the chair, you would find very bad management, which would surely result in the useless waste of time.

Under the conditions which regulate business in this city, I would suggest that your day be divided as follows:

Reach your office about fifteen minutes before your hour, in which time a little general supervision is given to everything about the place, that all may be in readiness for your first patient, whether this be at 8 or 8.30 (preferably the former). From this hour until 12 should be given, preferably, to your hardest work of the day. From 12 to 12.30 allowed for lunch, a short walk and a breath of fresh air in going to and from it. From 12.30 to 5 you should again be at

your post. This for six days in the week only, and the office closed on the seventh. Six days of steady work will be found sufficient for one week, and these hours should satisfy the most exacting patient.

At first these hours will probably give you ample time in which to do all your laboratory work as well as your operating. A little later, occasionally an evening or so will have to be spent in the laboratory, and still a little later it will be profitable to employ a good laboratory man, as your entire time will be needed at the chair.

Third, employment of an assistant at the chair.

A few years, and the fruits of conscientious and conservative work and the most minute attention to office duties will show themselves in such an increase of practice as to quite overreach your individual capacity, notwithstanding the methods adopted and the most perfect systematizing of the smallest details, whereby absolutely no time will be unnecessarily lost.

You will then discover that no inconsiderable portion of your time will be daily occupied by duties that could as well be performed by a skilled lady assistant, and thereupon the employment of one will be the next step toward the satisfactory handling of the growing practice.

To be a successful assistant, a young lady must be quick, quiet, gentle, attentive without being obtrusive, and intelligent. In your office her duties will be systematically arranged. Twice in each week, whether it may be considered necessary or not, every drawer in the cabinet should be thoroughly dusted, and the instruments therein rubbed with chamois or burnished, as the requirement may be. With the same regularity the electric engine and hand-piece should receive a thorough cleaning and oiling.

While the engine is being used for excavating, she should keep the cavity free from chips with the chip-blower, which will allow the wall to be always in plain sight, and that step in the operation will be much more rapidly completed. Just before being ready for it, she should prepare the filling-material, whether it be gold, amalgam, or cement, that all will be ready and no delay met with when the same is called for. It should be her duty to see that supplies of all kinds are always on hand; a small stock of everything that is used should be kept in a cabinet reserved for that purpose. The rubber-dam should be cut in the sizes used, silk cut into proper lengths and waxed, spunk torn up into various sizes desired, and placed, according to size, into the several compartments reserved for it.

The lamp should always be ready for instant lighting. She should realize that her duties do not include entertaining the patients, and should understand that the less she has to say the better satisfaction will she give. In a little while she will learn to anticipate your wants, and a look or semi-gesture may be frequently used instead of a sentence. That during a protracted sitting she will rapidly perform one duty after another, with scarcely a word from yourself, will be frequently a source of surprise to the patient.

In cohesive-gold operations, much time is saved by her feeding the gold, and very frequently you will find that a cavity that could not be kept dry with a napkin long enough to fill with amalgam, if you had to stop to pick up and place the pellets in position, can be readily filled when she feeds the pellets as rapidly as needed, and so the use

of the dam will be dispensed with. As these cases are invariably those in which the application of the dam is accomplished with more or less difficulty, a very great saving of time will be here effected by her assistance.

Besides this, it should be her duty to receive all patients, make appointments, attend to your correspondence, look after the linen, and take a general interest in the welfare of the office.

It is unnecessary to add that in the matter of general neatness you will find that a lady assistant will be a great improvement on the office-boy, however good he may be.

I am aware that some operators teach their assistants to perform various portions of the operation,—for instance, the adjusting of the dam, and even the polishing of the fillings,—but these duties I would consider by all means the function of the operator only, and as such advise you to perform them.

Fourth, engagement of an associate.

You will probably discover that in this life one overcomes one difficulty only to be met by another.

For a while the increased capacity for work by the addition of the assistant will be sufficient to meet all requirements, but it will not be for long. Continued diligence, earnest study, and faithful work will be sure to meet with their reward, and in due time, if you will pay particular attention to your hat-band, and notwithstanding the strain upon it still manage to keep it comfortable, and not enlarge it, you will probably find that desirable patients will have to be refused simply for want of time. This must not be considered a business-like state of affairs, and the solution of the problem must be considered.

Two means for accomplishing the desired result will present themselves. First, raising the fees and so cutting off a certain portion of your clientele; and second, the taking of an associate, and so increasing the capacity of the office. As the question of fees is to be considered later, it will only be necessary here to state that choice will probably be given the latter, the reasons therefor being given later on.

An associate must therefore be sought and found in one of equal experience and conservative methods as your own; and this addition to your office you will find to be a great relief to you, but at the same time you add somewhat to your duties other than at the chair, which same will be considered under the next heading.

Fifth, employment of a secretary.

Heretofore the office-boy should receive the patients at the door and usher them into the reception-room, where your assistant would receive them and take their names. If it should be a mere question of changing an appointment or making an inquiry, or perhaps the payment of a bill, this service should be performed by her without your being disturbed; but very frequently the leaving of her post upon such occasions would cause serious interruptions to your own work,—for instance, when she was malleting. Again, it will soon be found that in order to keep accounts perfectly straight and avoid errors, a single set of books must be kept in which the work of both your associate and yourself must be entered. The increased number of patients will also call your assistant from your chair much more frequently than before, and it will not be long before you will realize that

your "staff" must be increased by the addition of a secretary. A young lady must be secured for the position, and her desk should be placed in the reception-room.

In an establishment of the size which yours will by that time have assumed, there will be in the course of a day perhaps half a hundred callers, upon one pretext or another, many of whose missions may be attended to by the secretary, and thus your assistant and you will be relieved of these annoying interruptions. Your assistant being relieved of the correspondence, has just that much more time to devote to her other duties, and at the same time it will receive much more prompt attention. It will be the duty of the secretary to receive all patients whom the office-boy ushers into the reception-room, and advise either yourself or your associate of their presence.

When one calls for an examination or the changing of a wedge, or any attention of that sort, she should seat the patient in the chair in the consultation-room, and notify you when she is ready. It will then occupy but a few seconds of your time to slip in there, do what is necessary, and return to your own chair.

When it comes to an extraction with gas, you will need only to be called when the patient (if a lady) has been gotten ready. You may then give the gas, extract the tooth, see that the patient is all right, and leave her in her charge. This will require but a very few minutes. It will be her especial duty that you be not interrupted uselessly. That mysterious trait known as "womanly" intuition will soon teach her to "size up," as it were, a doubtful-looking customer, and when she discovers he or she is a book-agent or insurance fiend, or other creature of like stamp, she must be an insuperable barrier between such and your operating-room. She should also take charge of the "supplies," and order such as are needed, once a week. The linen of the office, not an inconsiderable item, should also be under her care.

The method of book-keeping to be inaugurated will be in a great measure under her care, she keeping the day-books upon which is entered all cash received and work charged, and the ledger into which the entire work of both your associate and yourself is entered. It having been considered necessary that a check upon this be kept, that no errors be made in the making out of the bills, the following system you may find to prove very satisfactory.

It should always have been your custom to keep in your ledger a short-hand record, in hieroglyphics, of what work was done. The individual tooth, its surface, and with what it was filled, should form a complete record, done with a very few strokes of the pen. These entries should now be continued in your own individual ledger. On a little slip should be daily written the names of the patients and the work done, and the charges made for the same, in plain terms. The secretary takes these and enters them into the blotter and ledger. At the end of the month she should make out all the bills, which should be given to your associate and yourself to verify. Your assistant should take yours and place each one in your record ledger at the page upon which the account is kept, and it therefore will require but a few moments of your time to rapidly go through with that work. As each one is found to be O. K., it is checked, while occasionally an error in one may be found and corrected. In this simple manner mistakes are carefully guarded against.

To have the arduous duties of the book-keeping and making out of the bills taken off your hands will prove a great relief, for otherwise this work would have to be done in a great measure at night or on Sundays.

Sixth, the problem of fees.

The question of fees is one which you will have to carefully consider, and no doubt will prove an essential factor in the success which you are to achieve.

Naturally, a younger man like yourself, who has made no reputation by the durability of his work, will be sought for by patients for various reasons. That you are neat, and careful, and gentle, and apparently a good operator, all will tend to increase the number of your patrons in your early days ; but many will be probably as greatly influenced by the fact that, being a younger man, without the reputation of your older *confrères*, and without their extended practice, your time will be less valuable, and naturally your charges for services will be less. As your practice increases, the charges may be increased from time to time until they have at last reached the rate charged by the greater number of the leading operators of the city. This state of your financial affairs should coincide with your having acquired a "full" practice.

When, later, your practice will have increased, as before stated, you should realize that the years of the advantageous practice of a dentist are comparatively few.

With the lawyer and physician, each succeeding year but adds to his experience and usefulness ; but with the dentist, as all know, it is quite different, for at the age when either of the others would be in his prime, the hard-worked dentist is on the decline.

The question of increasing your fees beyond the rate charged by your *confrères* should be seriously considered, and you will probably conclude such would not be a judicious change, as they will then be already as high as will be warranted by the general conditions governing your city. While you will be aware that many of your richer patients would pay the increased rates, you should also know that such a course would be followed by the loss of a certain portion of your clientele who no longer could afford to come to you, and this portion would probably include a great many who had been among your first patients, and having been under your care all those years, in whom you should feel a very deep interest. Therefore, after much serious consideration, you will probably conclude to allow the charges to remain, and take an associate to increase the capacity of the office.

Beginning your professional career under the usual circumstances, you will probably find that in the matter of finances you will have to adopt the custom in vogue among the generality of professional men.

At the start, when "time" will be one of the tangible objects of which you will have a superabundance, it will be just out of the question, thanks to the customs instilled into the minds of the public by your predecessors, for you to conduct your practice on a business-like and "cash" basis. It is not necessary for me to attempt to explain why this will be so, but it is enough that the statement be made.

In the course of a few years, you will probably discover quite a large number of bad and unpaid accounts. However, as this work

will have kept you from being idle (and consequently out of mischief), and given you experience (which no doubt you will have needed), it may not be considered a "dead loss" after all. But when the time comes when it will be your privilege to select your patients, it will be opportune to make a radical change in your financial arrangements. Then it will be in order to carry on your practice upon the usual business basis, which means monthly payment of all accounts, and you will soon find this to be a very great improvement upon your original methods. Bills should then be rendered upon the first of each month, and it would be well for a notice to that effect to appear upon your appointment cards.

In whatever manner you may prefer to regulate your fees, you will find that dental services cannot be evenly charged for, like so much flour or sugar, for which all pay exactly the same per pound. There are a great many reasons why I would advise you not to regulate yours by the clock, although it is generally understood that charges are based upon the character of the services rendered and time consumed in performing them.

Dr. Jack and all others who charge for time irrespective of what is accomplished within it, are not entirely consistent, in the end, for they admit that for certain classes of work, extractions, etc., there is a definite fee. Again, the same operation can at various times, irrespective of the patient, be much more rapidly and satisfactorily performed than at others. What would he do under such circumstances, and if honest in the matter, could an even distribution of the time, charging a certain portion to himself, be possible? I think not.

Altogether, I am sure that the general public, at least in this section, are better satisfied with stated charges for definite work, and so it would be my advice to you to adopt this rule.

In conclusion, young man, I will say that I have made a study of the smallest details in the practice of our chosen profession, which has resulted in the system herein laid before you to follow.

You have just left college, and, with college honors fresh upon you, probably imagine that rich fields are waiting to be harvested by your hand. And so they are, but for all the knowledge with which you are possessed (which, by the way, you will probably see diminish from year to year), before you may take the sickle in your hand to gather in the grain a season of work will intervene.

Diligence and perseverance are bound to succeed, and when the time shall have arrived which finds you reaping the fruits of years of labor, you must find yourself, in point of fact, the mainspring only of a large establishment, and thanks to your trained assistants and their attention to their duties, you will be able to keep the system in motion without any undue friction.

Then your time and your energy may be devoted to your patients, the duty to whom becomes from year to year only the more difficult, owing to the steady advance being made in the science of dentistry.

THE VALUE OF COMPARATIVE RECORDS.

BY D. W. BARKER, M.D.S., BROOKLYN, N. Y.

(Read before the Second District Dental Society of the State of New York, April 10, 1893.)

THE title to my essay is hardly accurate, but it is the best that suggested itself to my mind, for I have no other records with which to compare mine; but I desire to show the value of such records if others would keep them, and perhaps induce others to keep them for future comparison. Therefore the record which I shall present this evening is given to show how easily such a record may be kept, and how valuable a thing it is in itself, and how valuable a comparison of such records would be. I hope in the future we shall be able to compare many such records, to our mutual advantage and improvement.

The subject of the treatment and filling of pulpless teeth is a well-worn but ever-fruitful one; but I have no hobby to ride this evening, for I do not propose to discuss or describe methods at all (only in so far as may be necessary to make clear what I have to say), but to confine myself wholly to results.

Some time ago I became impressed with the utter uselessness of much of the talk that we hear in society meetings on this subject, owing to the simple fact that the speaker can give no accurate data as to the number of cases treated and the exact proportion of successes and failures. For instance, take the matter of immediate root-filling, about which so much has been said at one time and another. One man may say, "Well, yes, I've tried it, but don't think much of it," and another will say, "Yes, I practice it in a certain class of cases, and it is a good, sound, reliable practice." Now, one man has given a negative and the other a positive answer, and if we have equal respect for their ability we are no wiser on the subject than before; but if you next ask these two men, "How many cases have you treated?" and the first man should say a total of twenty-five cases, and the other man should report two hundred and fifty cases, I argue that there is as much difference in the value of their testimony as there is in their experience as shown by their figures. To carry my illustration a step farther, in order to get the full force of my meaning, we know nothing of the conditions which bear on the result. The first man's twenty-five cases might include a number that were foredoomed to failure and disaster because they were putrescent when they came into his hands; while the other man's two hundred and fifty cases might not include a single one such case. There are many factors which have a bearing on the result, and which affect or should affect the valuation which we place on such testimony if we but knew them, and if we do not know them the testimony of such witnesses is almost worthless.

Impressed with this idea, I resolved that when I spoke on that subject again I should have positive figures to substantiate what I said, and about a year ago I commenced to keep a careful record of the pulpless teeth that came into my hands for treatment, and what I have to offer you is simply an analysis of that record. I do not include here any tooth which has been previously treated and filled, but only such as receive treatment and filling of the root at the pres-

ent time. I will illustrate on the blackboard the manner in which the record has been kept.

Name.	Date.	Tooth.	Pulp Dead.	Pulp Alive.	Arsenic Applied.	Carb. and Cocain Used.	Immediate Root-filling.	Treatment of Root previous to Filling.	Inflammation after Root-filling.	Previously Filled.	Abscess Cured.	Rubber-Dam Used.	Rubber-Dam not Used.	Tooth Extracted.	Remarks.
Mr. Smith.	Jan. 1	m 1		1	1	1	1			am.			1		

The total number of cases recorded is 174. They are classified as follows : Central incisors, 4,—3 right and 1 left upper ; lower centrals, 0 ; laterals, upper right 10, upper left 5, lower right 1 ; cuspids, upper left 1, lower left 2 ; bicuspid, 73,—upper right 1st 11, upper right 2d 10, upper left 1st 10, upper left 2d 12, lower right 1st 4, lower right 2d 9, lower left 1st 5, lower left 2d 12 ; molars, 78,—upper right 1st 9, upper right 2d 7, upper right 3d 1, upper left 1st 11, upper left 2d 6, upper left 3d 1, lower right 1st 14, lower right 2d 6, lower right 3d 1, lower left 1st 10, lower left 2d 12, lower left 3d 2.

When these teeth come into our hands they are of two classes : they are already dead or they are not, and the kind of treatment they are to receive depends entirely on this difference. If the pulp is alive, partly or wholly, we proceed to devitalize it ; but if it is not, then no such treatment is needed, and our treatment is directed to the mechanical and chemical removal of the products of the decomposition of the pulp. Therefore I again classify as follows : Already dead, fifty-two ; those alive, partly alive, and exposed, one hundred and twenty-two. Of those already dead, but one was immediately filled, all the others received treatment previous to filling the root ; of those more or less alive, seventy-six received application of arsenic ; sixty-four were removed more or less alive with the assistance of carbolic acid and cocain, and twelve of these without previous arsenical application. Seventy-three received immediate root-filling ; of these, six showed marked soreness a few days after filling, which subsided in a few days ; of these, three were molars and three were bicuspid. None of these seventy-three abscessed after filling. Of those already dead, ten abscessed after treatment was commenced, but none after the treatment was concluded and the roots filled ; of these, six were old chronic cases, four were fresh cases ; in eleven cases the roots were filled with cotton dipped in aristol, and in only one of these was there any marked tenderness afterward. All others (one hundred and thirty-nine) were filled with cotton dipped in chloro-percha.

In passing, let me here refute in advance any imputation of filling roots with cotton. I do not. The cotton is merely the vehicle for carrying the semi-fluid chloro-percha to the farthest possible limit, and as soon as the solvent has evaporated it is as solid as though composed of chloro-percha only.

In twelve cases a drill was broken off in the root, and being unable to remove it, it was left there; in no case, however, was there any trouble arising from this fact. This would seem to indicate that a broken drill is a pretty good sort of a root-filling, but I don't think I would go so far as to recommend it. It is too expensive. That they did not give trouble, every one of them, is a fortunate accident and nothing more.

It is said that it is not advisable to fill pulpless teeth for children, that they are more susceptible to subsequent trouble than the teeth of adults. This record shows seven first molars for children, all of which are still doing well. There are forty-two which had been previously filled (the term "previously filled" means cases where the pulp has died after the tooth has been filled and the filling has remained intact, and that the filling has failed to prevent the pulp from dying. It does not include cases where the tooth has again decayed and this second attack has exposed the pulp). Some of these teeth had been filled a long time,—one with amalgam two years; one with oxyphosphate three years; one with gutta-percha three, and another four years; one with amalgam three and a half years; one with oxyphosphate seven years; and one had worn a gold crown for three and a half years. Three cases had been filled a long time without any root-filling whatever. In two cases the pulp had died without any decay whatever in the tooth. In two cases the patient was pregnant, one of them having three dead teeth. They were all saved, but the other one became so troublesome that it had to be extracted.

The largest number of pulpless teeth for one patient was six. The total number successfully treated and filled is one hundred and fifty; number still unfinished sixteen, leaving eight to be accounted for otherwise. Of these five were transient patients who did not have the work completed, and three were abandoned as unsuccessful.

In giving you the results of this record, no attempt has been made to "go behind the returns" or doctor the figures in order to make a favorable showing; but I have tried to keep the record as exact as possible, and to give it to you just as it stands, and if any part of the showing is uncomplimentary to the operator no pains have been taken to disguise the fact.

This simple method is valuable to me in unforeseen ways. It enables me to get the complete history of any given tooth at a glance, and this is very often a very handy thing to have. A patient returns and reports trouble in a tooth which was treated years ago; I cannot remember all the details of its condition when it came into my hands and what I did with it, but a glance at my record at once shows me that it was in such and such a condition and received such and such treatment.

Also, it enables one to compare his work with that of others, and to tell at once whether he is doing as well as he ought. If, for instance, another man shows a larger percentage of successful cases by the use of methods or materials different from mine, then I owe it to myself and my patients to adopt his methods or materials. If another man shows better results than I do by means of the same methods or materials, then there is something wrong with me, and it behooves me to find out what the matter is and rectify it. Not only

this, but it will also enable us to judge of any new medicine, instrument, or material that may be introduced; and only such testimony is worth very much consideration. For instance, some operators strenuously insist that it is absolutely indispensable that the rubber-dam should be used in every case in order to exclude saliva, and with it some germs of disease that would be sure to breed trouble if the saliva once entered the canal. That theory will hardly pass with me, for the reason that I have here a record of one hundred and fifty cases, on some of which the dam was used, but in probably more than half of which it was not used, and yet there are no marked number of failures that would indicate that the presence or absence of the dam had anything to do with the result. Other operators insist on the use of some form of root-drier in which heat is used to produce an abnormal condition of dryness. In the face of the fact that here are one hundred and fifty cases treated successfully in which no such instrument was used, I cannot take very much interest in the root-drier. Show me a record of cases in which a smaller percentage of failures is shown where the root-drier is used than where it is not, and I'll buy one to-morrow.

Some have great fear that the buccal roots of molars and bicuspid will abscess, and go to considerable trouble to show that such roots as cannot be cleaned and filled to the apex of the root must be embalmed or sterilized; but here is a record of seventy-eight molars and seventy-three bicuspid, and how many of them have abscessed after filling? None; and yet no process of embalming or sterilizing (strictly speaking) was used.

These illustrations indicate the directions in which such records would be found useful. It may be objected by some that I make no allowance for the "personal equation,"—that is to say, that one operator will be more successful in his own way because of personal skill that another may not possess. That is true, and must always be true, no matter what method or system or instrument is under consideration. I have not forgotten that fact, but I have not taken it into consideration here and now, because it is inherent in the very nature of the case or any case where human skill, judgment, or ability is a factor. It is impossible to eliminate the "personal equation," and we must accept the fact and make some allowance or margin for it, and let it go at that. At present there is no exact, positive, well-defined system that is recognized by the entire dental profession as being the best that has ever been devised. Different men advocate different theories and methods, but who can say which is the most successful? A writer in a recent number of the DENTAL COSMOS puts it exactly right when he says, "We accept that the gentlemen who advocate the various methods in this direction are sincere practitioners, and that their endeavors emanate from a desire to do good; still, the general knowledge is unscientific so long as no fixed, positive, and universal treatment exists."

Only by an analysis based on statistics can we arrive at any positive conclusions.

THE ANESTHETIC ZONE IN NITROUS-OXID ANESTHESIA.

BY JOHN D. THOMAS, D.D.S., PHILADELPHIA, PA.

EVER since nitrous oxid was introduced as an anesthetic, its physiological action has been the subject of study and experiment to ascertain, if possible, how its narcotic effects are produced. After calling out many and various opinions, the controversy seems to have evolved two settled theories. One, that narcosis is produced as the result of depriving the blood of its necessary supply of oxygen, causing true asphyxia; the other, while admitting that nitrous-oxid inhalation produces symptoms of asphyxia, affirms that the gas possesses purely anesthetic properties as well. Practical experience seems to demonstrate that the latter theory is the correct one. So firm is the conviction of many as to the existence of the factor of asphyxia in nitrous-oxid anesthesia, that several attempts have been made by different experimenters to combine nitrous oxid with various percentages of oxygen, with the hope of counteracting the asphyxiating effects, believing that a desirable anesthetic for prolonged operations could be so obtained. Thus far these experiments have not given the result they seemed to promise, if we except the method of M. Paul Bert, which, in a measure, fulfills the requirements, but the apparatus appears to be too complicated to warrant its extensive use.

In the DENTAL COSMOS for May, 1893, Dr. H. C. Wood, who has devoted much time to the study of anesthetic agents and their physiological action, gives the results of five experiments with nitrous oxid upon dogs, from which he draws two conclusions. First, that they are "a confirmation of the view that nitrous oxid produces anesthesia by cutting off the supply of oxygen;" second, "that a mixture of nitrous oxid with oxygen does not seem available as a practical anesthetic." Experience seems to confirm the latter of the two conclusions as probably correct.

The laws of dosage must be taken into consideration in the administration of anesthetics, the same as with other drugs, and while the mixture of three or even five per cent. of oxygen would perhaps be perfectly compatible with children as well as with some adults, it will not successfully produce anesthesia with all.

Resistance to the anesthetic action of nitrous oxid varies much in different individuals. A man whose system would resist the intoxicating effects of an inordinate amount of alcohol will exhibit the same tendency with all anesthetics, so that such an individual cannot be brought readily under the influence of nitrous oxid if it be diluted in bulk with air or oxygen, while one of opposite temperament might easily succumb to a moderate amount of such a dilution with air or oxygen.

Again, the rapid action of the gas and its transitory effects confine the anesthetic stage to such narrow limits that it requires upon the part of the administrator greater experience than can usually be acquired by the regular surgeon to avoid, as Dr. Wood says, "the danger of passing from anesthesia to sensibility, or from partial to complete asphyxia." So it would appear, so far as generally understood and administered, that nitrous oxid is not applicable for prolonged anesthesia or promiscuous use in general surgery.

The research of Dr. Wood has experimentally shown the existence

of the anesthetic zone in nitrous-oxid anesthesia, and the conditions which limit its duration and extent. He, however, entertains doubts of its practical utility in surgical operations, because of its evanescent character and the narrow limits which separate it on the one hand from asphyxia, and on the other hand from a sudden return of sensibility. It is the purpose of this communication to show how in actual daily practice the zone of pure anesthetic action is attained and made use of, and how it may be prolonged and the anesthesia controlled in operations, other than the extraction of teeth, which require more time for their proper performance.

The existence of a zone of true anesthesia uncomplicated by asphyxia during the exhibition of nitrous oxid cannot be doubted by any practitioner or competent observer who has practically studied its action upon the human subject. That the evanescent action of the gas, due to its rapid diffusibility, confines the zone of true anesthesia to very narrow limits is likewise true, so that under the conditions which ordinarily govern the administration of nitrous oxid this factor in the physiological action of the gas may be, and probably is, generally overlooked. The importance of recognizing the zone of true anesthesia and taking advantage of it in nitrous-oxid administration requires no argument to defend it, for therein lies the question not only of its safe use, but of the successful production of the true anesthetic state which is necessary for its efficient use in minor surgery.

The anesthetic zone can be preserved from three and four up to eight, nine, and ten minutes, as has been frequently done by the writer, by using the nose of the patient as a valve to admit atmospheric air in sufficient quantities to relieve and avoid the accompanying asphyxia, and no better proof could be offered of the legitimate anesthetic properties of nitrous oxid than is given by cases so treated. To combine atmospheric air with the gas in bulk is not practically applicable, but to admit a small amount during the inhalation, as the disagreeable appearances of the accompanying asphyxia occur, will mitigate the asphyxiating effects in all cases, while in a majority of them they will be entirely obliterated, except perhaps a very slight discoloration of the lips, which no one could claim to be sufficient to produce narcosis by asphyxia. By experience one can detect the stage which marks the anesthetic zone, and, using the nose as a valve to admit atmospheric air as required, can produce complete and profound narcosis, free from asphyxia, the patient meanwhile remaining as calm and placid as when under the action of any other anesthetic.

The evidences of perfect nitrous-oxid anesthesia, independent of the asphyxiating influence, are so abundant that to one in practice the first conclusion of Dr. Wood, that nitrous oxid produces anesthesia by cutting off the supply of oxygen, which he believes to be confirmed by his later experiments, seems to be open to question.

If we accept the symptoms of asphyxia to be discoloration, shortness of breath, violent efforts at expiration and expiratory convulsions, and finally exhaustion, and a feeling of impending suffocation, as is the case when nitrogen is inhaled, and compare them with the symptoms produced by nitrous oxid, they will be found to be greatly dissimilar in many respects.

The inhalation of pure nitrous oxid will produce discoloration to some extent, which may be much or little according to the tempera-

ment of the subject ; but there is no oppression as of impending suffocation, no violent efforts at breathing nor shortness of breath, while on the contrary there is at the beginning a feeling of stimulation and exhilaration, quickly followed by complete narcosis, from which the patient awakens only with recollections of a pleasurable sensation, with no succeeding languor or lassitude or even giddiness, and the whole space of time occupied is, in a majority of cases, less than two minutes. There may be accelerated heart-beat at the preliminary stage, but this is clearly due to cerebral excitement, caused by anticipation and nervous fear of taking an anesthetic. This rapid heart-action usually subsides to about the normal pulsation when unconsciousness takes place, and very seldom will fall below normal, except in cases of cardiac weakness.

In Dr. Wood's experiments it appears that to produce narcosis in the dog by nitrous oxid required two minutes and thirteen seconds, while by mechanical asphyxia the same was produced in two minutes and nine seconds, four seconds sooner.

Nitrous oxid will produce narcosis in man in from thirty to fifty seconds, a period of time much shorter, I understand, than is required by nitrogen.

The length of time required to produce narcosis by mechanical asphyxia, by experiment upon a human being, would be difficult to ascertain, but some time ago there was a performance given at a theater in Philadelphia by a man under the sobriquet of "The Man-Fish." He exhibited his specialty under water in a glass tank, and if my memory serves me he remained under water for the remarkable space of three minutes and nine seconds, and showed none of the symptoms of approaching asphyxia other than considerable discoloration. Taking that exhibition as a criterion, there could be no parallel between the two in regard to time.

We do have, however, in isolated cases, coincident effects of asphyxia which are, I think, to be ascribed solely to the want of oxidation when the pure gas is given. These consist of cases of constriction of the larynx or glottis, jactitations, opisthotonus, and muscular convulsions, but hundreds and thousands of people take the gas without giving the slightest indication of any of these, and they can be avoided almost universally by the judicious admission of atmospheric air at the proper time, as before alluded to.

There can be no question that the inhalation of pure nitrous oxid does carry with it some symptoms of asphyxia, the oxygen supply being cut off, especially when large quantities are given for the purpose of producing a profound anesthetic impression ; but the very rapid production of anesthesia indicates that the nitrous-oxid narcosis takes place much in advance of the effects of the asphyxiating accompaniment, except in very rare instances.

Here it would be well to consider what kind of people are likely to readily succumb to asphyxia.

In a conglomerate population such as we Americans are, we have people from the pale and exceedingly anemic to those of full habit and florid complexion, and the symptoms of asphyxia as produced by the inhalation of pure undiluted nitrous oxid will vary just as much as does the degree of blood-color in each individual between the extremes of the whole line. In the very anemic, heart-failure could be pro-

duced before any of the symptoms of approaching asphyxia would present themselves. In a healthy subject of brunette complexion and bilio-sanguinary temperament, perfect unconsciousness can be produced by pure nitrous oxid with absolutely none of the symptoms of asphyxia appearing, other than a slight discoloration of the lips, and this can be completely relieved by the admission of a proper amount of air so that it would be unnoticeable to the inexperienced eye. This class of people no doubt would be slow to succumb to suffocation under any circumstances, yet very easily come under the anesthetic influence of the gas.

Those of light complexion, with rosy cheeks and bright red lips, and those of the full habit and deeply florid complexion, will show to a greater or less extent the asphyxiating appearance, and some occasionally to a marked degree, when the pure gas is given. I have, however, on several occasions seen this condition extend to severe glottis constriction and convulsed muscles under the pure gas, which showed no such tendency by taking advantage of the anesthetic zone and admitting air as before indicated, when they have acted in a perfectly satisfactory manner during the narcosis.

The blood in these florid people seems to require the full amount of oxygen to relieve their systems of the accumulating carbonic oxid, and they are more difficult to handle, but they are not beyond the possibility of accomplishment with exceptional regularity.

There are some cases which from appearances seem to indicate that their blood is constantly in a semi-deoxidized condition; they not only show a dark red color, but their lips are as blue from apparent improper oxidation of their blood as most people show when well under the effects of the gas. Such cases are usually those whose respiration seems decidedly weak. They never breathe to the full capacity of their lungs, and their respiratory motion is sometimes as low as twelve or fourteen to the minute. These will show the asphyxiating effects more rapidly than the anesthesia. They will occasionally exhibit approaching suspension of the respiratory effort before the upper brain could possibly be affected by the anesthetic action of gas, and require the greatest caution in the administration.

Viewing all the varying symptoms of nitrous-oxid narcosis from a practical standpoint, it is clearly evident that the inhalation of the gas produces a dual effect,—viz, that it produces perfect anesthesia independently of any other influence; that its administration carries with it accompanying symptoms of asphyxia, which appear in degree only as the blood of the individual demands a full or partial supply of oxygen during the short space of time required for the inhalations, and this can be relieved by discovering the anesthetic zone and admitting atmospheric air in such quantities as judgment dictates; and that the asphyxia narcosis will dominate the purely anesthetic effects of the gas only in such cases as are intolerant of the slightest contraction of their full supply of oxygen.

From a personal experience of considerably over one hundred thousand administrations, I am impressed with the conviction that death from nitrous oxid will be produced by strictly physiological effects in but two ways. Other forms of death would seem to be purely coincident or accidental, several of which might happen. A tooth or some foreign body could get into the larynx, or a patient

might be strangled by constriction of the throat or swallowing of the tongue ; in either case it would be an accident if the operator failed to get the tongue forward and the obstacles removed, or neglected to perform tracheotomy in time. Coincident with the inhalation one might, immediately before or after, be stricken with any one of the many diseases which carry people off, in the car, on the street, or elsewhere. This is liable to happen at any time, and could easily be consequent upon preliminary suffering or the fear and excitement which nearly always accompany the anticipation of taking an anesthetic and undergoing a surgical operation, no matter how slight.

But cases of death which could be legitimately laid to the effects of the gas, or rather the want of oxidation which accompanies its inhalation, comprise those at the two extremes of the line of temperament which I have mentioned,—the markedly anemic and the very florid or deep-red-blooded people,—the anemic young girls who are suffering from the suppressed or retarded functions of womanhood, the marked pallor of the morphia-taker, and the waxy complexion of Bright's disease. The blood of these is so deficient in red corpuscles that the lack of oxygen will be impressed upon the nerves of the heart almost simultaneously with the first breath of the gas, and syncope follow as rapidly as will the suspension of breathing in those cases which mark the other extreme,—viz, the very florid and slow breather ; in the one heart-stoppage would be the cause, in the other suspension of respiration, in which the heart would continue to pulsate for perhaps several minutes after. In each of these conditions the result would evidently take place before the upper brain could be affected to anesthesia. These two comprise the dangerous cases from the physiological effects of nitrous-oxid inhalation, and both of them would appear to be from the asphyxiating accompaniment, for they will readily respond to atmospheric admission.

I would here strongly emphasize the condemnation, which on another occasion I iterated, respecting the use of the face-piece in connection with the inhaling apparatus, which idea has been imported from abroad and is used extensively in this country.

The effects of nitrous oxid as they develop are shown most clearly through the mucous surfaces of the lips, so that the administrator can tell at once how much the want of oxygen is affecting the blood, and he can relieve it accordingly. In the event of approaching danger the signs would be seen in the lips, either by too much discoloration in the florid or plethoric habit, or excessive pallor in the anemic, in time to avert disaster ; but with the face covered this most reliable index is lost to view, under which circumstances the first indication to apprise the operator of approaching danger would be cessation of respiration, which might occur too late for resuscitation.

THE QUESTION OF PERSISTENCE OF VITALITY IN THE PERICEMENTAL MEMBRANE.

BY DR. F. O. JACOBS, SAN FRANCISCO, CAL.

I SAW in the DENTAL COSMOS for February, 1893, the report of a discussion of a paper of Dr. W. J. Younger's, read at a meeting of the Second District Dental Society of New York. As my name was

pretty freely used, and my report to Dr. Younger of the examination (microscopical) of an implanted tooth adversely criticised, I trust that it will not be out of place if I take the liberty to reply.

Some of the objections were evidently made in good faith, and some remarks were out of place, consisting of personalities having nothing whatever to do with the matter under discussion.

Dr. Heitzmann opened the discussion by speaking of the fixation of leaden bullets in live tissues, and compares it to the living tissue attached to the tooth in question. The case is entirely different. The tissue formed around the lead does not attach itself to the lead ; it simply invests it,—an obvious difference. A living tissue does not attach itself to a dead one. Then, again, he compares the absorption of an implanted tooth to that of a temporary tooth, and says, "All that I have had the opportunity to examine I have found in the process of absorption corresponding to the absorption of temporary teeth." Just so. But the temporary teeth in the process of absorption were alive. A dead temporary tooth is not absorbed. He speaks of a pulpless tooth as being dead. That would be a question for him and Dr. Sudduth to settle, for Dr. Sudduth claims that the principal supply of nourishment comes to the tooth from the outer membrane covering the cementum, and not through the pulp. In that case, it would make no difference whether the pulp was dead or not. As I believe that a part of the blood-supply comes through the peridental membrane, a low degree of vitality may be kept up even after the pulp was dead. He says also, "An extracted tooth, therefore dead." Now that is the question in dispute. Does death of a tooth at once necessarily follow extraction? There is no doubt but that death of the pulp would at once follow such an operation, and probably the pericementum, but not certainly. Desiccation of the pulp which would follow such an operation would destroy its structure, and that, of course, would be death. But amputation, or the breaking apart of an organism, does not in all cases produce death, nor does desiccation. Much depends on other conditions. Numerous instances could be cited to show that neither desiccation nor the breaking or cutting apart of an organism produces death in all cases.

It will not be necessary to cite such cases ; all can call them to mind, especially so experienced a biologist as Dr. Heitzmann. Now, since that is the case, and since the teeth are suspected of being composed of a tissue of that character, it is well to consider upon what other conditions the life of a tissue or an organism depends. Vitality depends chiefly upon two forces—two chemical activities—operating in direct opposition to each other ; analysis and synthesis acting upon or in the substance, protoplasm,—the building-up and the breaking-down process. If one of these activities is arrested, death is the result in the parts so affected. If both, there is a suspension of functional activity only. When death occurs in a tissue, there is such a chemical change as to either fix or prevent the balancing of the two forces. When an animal or a plant is composed of various organs or tissues, each performing a single function, or in other words, among the higher organized animals and plants, where there is a division of labor, if there is a separation of the organs or tissues, death is usually the result. But where the entire animal is composed of one simple tissue, separation or amputation does not produce death in either part. I

will cite the fresh-water hydra as an instance of this kind familiar to all or most microscopists. If an organism is of such a structure that desiccation does not destroy its structure, death does not always follow. Many of the unicellular plants and animals are examples which illustrate the fact that simple loss of moisture does not destroy life, but simply suspends vital activity by arresting mechanical and chemical action. Moisture is necessary to the activity of protoplasm; usually the more water it contains the more active it becomes, and if there is an entire absence of moisture, without other changes occurring, activity is simply suspended. It is a mechanical effect in one sense, but it also affects chemical activity. For if there is an entire loss of moisture, chemical activity is either suspended entirely or greatly retarded; but when the proper quantity of moisture is restored there is a renewal of the normal conditions. *Selaginella* is a familiar example showing that when loss of moisture does not have such a mechanical effect as to destroy structure, it merely suspends functional activity, which is restored again under proper conditions,—viz, restoration of the proper quantity of moisture.

Now, when a tooth is extracted it can receive no more nourishment; this suspends one of the chemical activities, synthesis, and if the opposing force was allowed to go on, such a change in the chemical nature of the living matter in the tubuli would soon take place as would prevent the restoration of vital activity. But the dentine and cementum contain but little moisture, and part readily with what they have. The structure of these tissues is not broken down either by the mechanical effect of extraction or the loss of moisture, and is of such a nature as to afford protection from chemical action of oxygen on the living matter within the tubuli of the dentine and the lacunæ and canaliculi of the cementum. Hence it might be expected, from what we know of the behavior of living matter under like conditions elsewhere, that these tissues would survive much longer than any other tissue of the body. How much longer I cannot say; I do not care to fix dates. Besides this, the living matter in the dentine is not highly specialized, performing two widely different functions,—that of conveying sensation and of nourishment throughout its substance.

In case of implantation, the normal conditions are restored or nearly so. The tooth can receive nourishment from the surrounding tissues, and if such conditions are set up as are described so elegantly by Dr. Andrews, it is not impossible, or improbable even, that vital functions or activity might again be restored in the tooth-substance.

The adhesion of the living tissues around, or rather to the tooth, is itself evidence of life in the cementum, and the absorption spoken of by Dr. Heitzmann, instead of being evidence of a dead tissue, is, on the contrary, evidence of a living one, but of a low degree of vitality, caused by the fact that the tooth must receive all its nourishment from the outer membrane instead of from the pulp also, which I believe to be the principal source of supply to the tooth-substance. Of course, if a tooth should die, it is dead forever. But I think I have shown how functional activity might be suspended in such a tissue without death. When protoplasm parts with its moisture only, there is not necessarily a chemical change in its substance. It is simply a mechanical effect. Its substance would remain motionless until moisture is restored, and would have only the appearance of being dead.

When a tooth dies, its organic tissues decompose, and invariably it darkens. But if vital activity be suspended only, by the loss of moisture, as we know is the case in some forms of life, no chemical change takes place in the tissues; consequently it would be expected to present a normal appearance. Whether the pericementum is capable of persistent vitality or not depends upon whether chemical changes take place in the tissue before desiccation, and whether the loss of moisture would destroy its structure, to a large extent, if not entirely. That there would be some difficulty in determining whether a new tissue formed in place of the original one, I admit, although my language in the report referred to would convey the idea that I thought it was the original pericementum. I am not certain, however, that the pericementum is not capable of persistent vitality. Dr. Andrews thinks competent persons would ridicule the idea. We are not always able, however, to determine the possible from the impossible.

Professor Joseph Le Conte believes (page 695, vol. v, Transactions of the Ninth International Medical Congress), that "the pericementum is exactly such a membrane as might be endowed with persistent vitality."

Dr. Andrews describes very nicely indeed the process which would be set up if the implanted tooth were alive, but exactly what would not be the case if the implanted tooth were dead: how the newly-formed tissue would surround the root of the implanted tooth, filling all microscopic inequalities of the surface of the tooth (cementum), binding the tooth in place, but he still thinks the tooth dead. Hardly probable. If the tooth were a dead one, surely such conditions would not be set up.

In answer to Dr. Andrews's question as to what I might expect as to discoloration, etc. When a tooth is extracted, a loss of moisture prevents decomposition; but if placed in the mouth again, the influence of moisture and the chemical effect of the fluids of the mouth would cause decomposition of the tooth-structure if the tooth were dead, and, consequently, discoloration.

I have the greatest regard for the opinions of both Dr. Andrews and Dr. Heitzmann. I am fully aware of their ability and reputation. Still, I think that in this case they hold to opinions not warranted by facts claimed or admitted by themselves. I have not the slightest doubt in regard to the technical knowledge of Dr. Sudduth, but it seems to me that he formulates theories without the slightest reference to known facts. For instance, he believes no change, or scarcely any, takes place in the tooth-substance after eruption (Transactions California State Dental Society, 1892). Now, if a tooth can live on and on for years in the mouth with little or no change in its tissues, does it make any difference whether the tooth is in the mouth or out? In teaching this, he also must ignore the appearance of the dentine in case of caries.

All things considered, it need not surprise us to find the tooth capable of persistent vitality; it is just such a structure, and the living matter it contains is of that low, unspecialized nature, as in other organisms characterized by that peculiar quality.

Who would not, at first thought, deny that there was a tissue in the human body in any particular constituted like a vegetable tissue? And yet the circulation in the dentine is exactly like that in vegetable tissues.

AMALGAM.

BY DR. THEODORE JOHNSTONE, NEWBURY, S. C.

AMALGAM is a familiar term to dentists, yet it is a very indefinite term. To me the term amalgam bears the same relation to its class of compounds that a salt does to its class.

An amalgam may be defined to be the union of mercury with a metal or metals,—*c.g.*, copper, silver, or tin amalgam; a salt is a compound formed when the hydrogen in an acid is displaced, either entirely or partly, by a metal, as sulfate of magnesia, sulfate of iron, etc. Now, to say that I treat caries of the teeth with amalgam fillings would be as unintelligible as for a physician to say he prescribes a salt for constipation. Sulfate of iron cannot take the place of sulfate of magnesia when an aperient is desired. It is true there is this dissimilarity: the many salts are made up of different kinds of acid radicals, while mercury is the fixed radical of all amalgams; but the physical properties of different amalgams are unlike as well as the physical properties of different salts; and where there is a difference in physical properties, very likely there will also be therapeutically when mechanically applied. Some salts are deliquescent, while others are efflorescent. We cannot say this of amalgams, though later on I think we will find the term efflorescent appropriate to some conditions observed in amalgams.

As to the fact of amalgams being chemical compounds I think no one will question; uniting, as they do, in definite proportions, becoming hard and crystallizing, these properties furnish sufficient evidence to verify this point. In what way this union exists we do not with certainty know. It seems to be totally different from all salts of mercury, and while there is a definite proportion of elements in the union of this compound, the mercury also bears a similar relation to the compound that water of crystallization does to a salt. In gypsum, for instance, water enters into the union in a definite quantity $\text{CaSO}_4, 2\text{H}_2\text{O}$. Yet, in making plaster casts, water is mixed with the plaster almost *ad libitum*; still, we do not fail to get the casts to harden, by what would seem to be an interference with its crystallization. When there is too great an excess of water, the strength of the cast is impaired.

Plaster of Paris is prepared from gypsum by burning the latter and depriving it of about two-thirds of water (Bloxam's Chemistry). When the same quantity of water is again added, this prepared plaster of Paris will again crystallize.

If we add too much mercury to alloys the amalgam will be wanting in strength, or rather imperfect in crystallization.

A plaster cast pulverized will not harden by the addition of water, neither will pulverized alloyed amalgams by the addition of mercury; but carefully dispel the water or mercury without overheating or oxidizing either compound before adding the water or mercury, then it will be discovered, after a sufficient length of time, they have become hard by crystallizing.

Different salts, also different amalgams, manifest unlike properties when subjected to various degrees of heat. Some crystalline salts will expand, swell up somewhat into a globular form, as some amalgams do when sufficiently heated. This expansion, etc., undoubt-

edly is due to the water and mercury present, for when both are entirely absent different characters are observed in these compounds.

I at one time did not believe in the spheroidal tendency of amalgam fillings, but my experiments have convinced me that there is no doubt such is the case with some amalgams, and I believe the result of these experiments will cause others to be of a similar opinion. Let me, however, state here that these tests are not very rigid, and some are not accurate, but are as good as my apparatus would allow, and will answer every purpose to prove to the naked eye what is going on in the microscopic world.

My experiments were made from three different kinds of amalgams,—viz, gold and platinum, white alloy for front teeth, and copper. To ascertain which requires more mercury for amalgamation, my process was as follows :

I weighed ten grs. of the first two, then mixed it with mercury, pressed out all excess of mercury through chamois skin with tweezers ; the gain in weight was about three and a half grs., total thirteen and a half grs. I then weighed thirteen and a half grs. of copper amalgam, placed it over the flame of a spirit-lamp, and kept it there until all of the mercury appeared to be dispelled ; the loss was about three grs.

Second Experiment.—Gold and platinum, five grs.; mercury to amalgamate after excess was squeezed out, three grs.; total, eight grs. White alloy, five grs.; mercury, two grs.; total, seven grs. Copper amalgam, eight grs.; loss of mercury by squeezing, one-half gr.; total, seven and a half grs.

Third Experiment.—Gold and platinum, eight grs.; loss of mercury by evaporation, one gr. White alloy, eight grs.; loss of mercury by evaporation, one-half gr. Copper amalgam, eight grs.; loss of mercury by evaporation, three grs.

I do not consider this a fair test, for prescription scales which would not weigh less than one-half gr. were used. These scales, though, are delicate enough to show that no definite amount of mercury enters into this compound when prepared for filling teeth.

The copper amalgam appears from calculation in the experiment to have given up all of its mercury, while the alloys still retain two grs. and one and a half grs. respectively. The specimens placed under a lens show that there is mercury in the alloys, but no particle can be detected in the copper amalgam.

Fourth Experiment.—A brass matrix was filled with the same kinds of amalgams, all excess of mercury pressed out ; instruments used, oval burnishers (Dr. Abbott's). After the fillings became hard, they were put over the flame of a spirit-lamp. A bulging of the gold and platinum, and the white alloy from the cavities, somewhat globular in form, was observed while the copper gave up its mercury without any apparent change in form.

A sufficient undercut was made in the cavities to retain the fillings, so that they would not fall out.

The fifth experiment only shows how porous the alloyed amalgams become when the mercury is evaporated from them, which is not so with the copper.

This proves to us that the behavior of amalgams is different under the influence of the same agents and the same circumstances. Com-

pound amalgams seem to possess entirely different characters from copper amalgams.

The argument that now arises is that the heat of the mouth never reaches that of the flame of a spirit-lamp, therefore these changes cannot be brought about by heat. Mercury in the free state is sensibly volatile at as low temperature as 67° F. The presence of metals certainly impedes it to some extent, but the normal temperature of the mouth is about 98° F., rising much higher in cases of fever, when it has been known to reach even 107° F.

Now to return to the study of efflorescent salts. They are such salts as become anhydrous, reduced from a crystalline form to a powder, when exposed to a dry atmosphere even at an ordinary temperature, at the expense of its water of crystallization.

A crystalline salt is supposed to contain (1) water of crystallization, (2) water of constitution. The first, in some instances, is dispelled at ordinary temperatures of the air; the second is more intimately united, therefore will require a more elevated temperature to dispel it.

Apply this fact as a theory to amalgams, that they have mercury of crystallization and of constitution. In some instances could not we reasonably expect a part of the mercury of crystallization to be evaporated when the temperature of the mouth exceeds the temperature necessary for its volatility?

We often notice with some fillings a change about the margins of cavities, not so smooth as when first finished; such troubles, I believe, are not found when copper amalgam is used, if the condition of the mouth indicates its use. It can be highly recommended in some cases, but there are times when it will not become hard in the mouth. I do not know, and cannot even suggest, a cause for this; but this objection can be overcome by the addition of a small amount of silver filings:

Copper amalgam, gr. xii;
Silver filings, gr. ii.

Soften the copper amalgam in the usual way for filling, then add the silver filings, working it in till amalgamated. Squeeze out excess of mercury, and it will be found to harden or crystallize in a short time.

This preparation can be used over time and again, as copper amalgam is, adding mercury when too dry. The addition of silver will make it set very quickly. There are many in the market which are worthless, but all amalgams should not be condemned as filling-materials because such is the case with some. The dental profession stands in need of a good plastic filling-material, and I hope we will soon find one which will possess everything that can be desired.

A CASE OF EXCESSIVE HYPERTROPHY OF THE GUMS.

BY DR. J. W. HISEY, CLEVELAND, O.

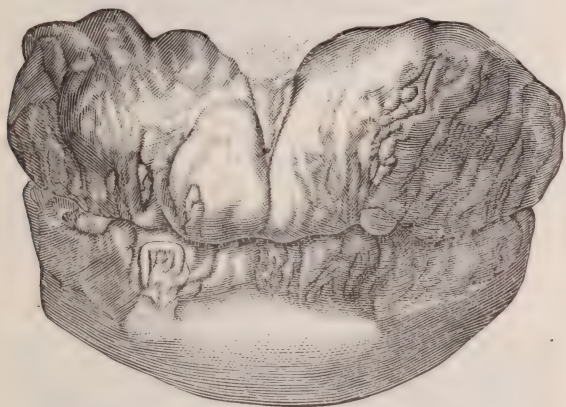
THE following case is one of special interest on account of the remarkable hypertrophy and its rarity, therefore of sufficient importance to be placed upon record.

I find a few such cases mentioned by Gross, Pollock, Heath, Salter, and MacGillivray, occurring in weak-minded and ill-developed children,

but none were exactly like this. The patient, a well-developed, bright, intelligent, well-educated Hebrew boy, H. K., age fifteen, of good family history, presented himself at my office for treatment of enlarged gums, which were growing rapidly, producing considerable deformity of the mouth, greatly interfering with speech and mastication. I was astonished at the great size and thickness of the pathological growth, which extended in an unbroken line the entire length of the alveolar border of both upper and lower jaws, also dipping into the floor and roof of the mouth, internally and externally, to the extent of three-quarters to seven-eighths of an inch, where it ended abruptly, being more pronounced upon the buccal surface. (See Fig. 1.)

His father and mother having died when he was quite young, I was unable to trace his history or family record back farther than his second year, at which time, as I learned from parties who adopted him, he had enlarged gums and no deciduous teeth. At that age they had his gums lanced time and again, and yet no teeth appeared. He entered the Jewish Orphan Asylum of Cleveland, O., when but

FIG. 1.



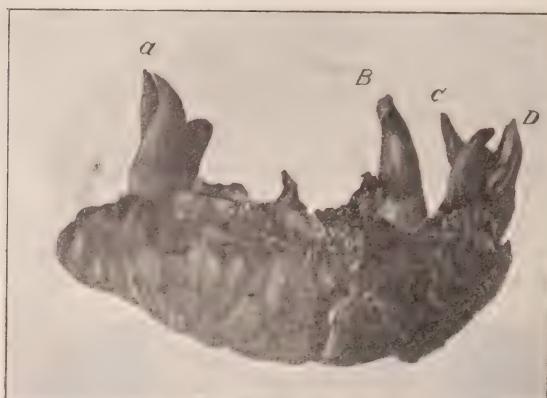
five years of age, where I ascertained that he had a few deciduous teeth which erupted very late, were few in number, very rudimentary, were soon loose and shed. Of the permanent teeth, he has but six visible,—one superior left central incisor, three inferior bicuspid, and two molars, and they are completely imbedded in the morbid growth, which is a dense, inelastic, firm, unyielding tissue, having the natural rosy hue of the normal gum. There is no doubt that the hypertrophy was present at birth.

In the median line corresponding to the space between the central incisors is seen a shallow groove or depression, which extends externally in a vertical line from the frænum of the upper lip to the margin of the growth, partially dividing it into lateral halves.

In thickness the growth on the superior jaw measures on the free margin in front one-half inch. It gradually widens from this point backward to a greater extent on the right side, until it reaches a point corresponding to the wisdom-tooth, where it gives a measurement of an inch in thickness. The measurement of the lower jaw is slightly less. The mucous membrane covering the growth is comparatively

smooth, presenting no abnormal papillæ, but the eminences and depressions mark plainly the positions of the imbedded teeth. The crowns of the erupted teeth are partially overlapped by folds of this tissue, which in the lower jaw becomes inflamed, producing a fetid dis-

FIG. 2.



charge, similar to that which sometimes occurs in connection with impeded eruption of the wisdom-teeth.

In looking up the history of such cases, I found the only course to pursue was to remove the gums, teeth, and alveolar process, in order to effect a cure. I therefore took him to Philadelphia, where, in

FIG. 3.



consultation with Dr. James E. Garretson, the plan of operation was decided upon.

The following report of the surgical treatment of the case is furnished by Dr. M. H. Cryer, chief of clinic, Hospital of Oral Surgery, Philadelphia, Pa. :

The patient was brought by Dr. Hisey to the Hospital of Oral Surgery connected with the Philadelphia Dental College, February 17, 1893. After a minute and careful examination by the surgeon in charge, Professor James E. Garretson, it was decided to remove the growths by two operations,—*i.e.*, that of the upper jaw on the following day, February 18, 1893, and the lower as soon as the patient had recovered from the shock of the first and the parts had become sufficiently healed.

The First Operation.—The growths were very large, making the lips so tense that it was only possible to open the mouth or separate the jaws to a slight extent. It was therefore found necessary to divide the upper lip in the median line, and make an incision below and curving around the wings of the nose; then dissecting each half of the lip from its attachment to its respective side of the jaw, the parts being held back on each side by assistants.

An incision was made commencing at the region of the tuberosity on the left side above the abnormal growth and extending around externally to the tuberosity of the right side, a similar incision being made on the inside; then with a circular saw driven by the improved surgical engine a great portion of bone and some of the roots of the teeth were cut through. In the anterior portion of the mouth, where the incision was made above the crowns of the permanent teeth, the engine worked well, but posteriorly the saw came in contact with the crowns of the molars. Here the bone-cutting forceps were used to complete the section. The remaining soft tissue was cut away by the use of the knife. All of the mass shown in Fig. 2, except the four teeth *a, b, c, d*, was taken out in one piece. Afterward the teeth as marked in the illustration—the second left bicuspid, which was unfortunately lost, and the root of the teeth that had been cut through by the engine—were extracted, the ordinary extracting forceps being used. Succeeding this, suitable burs were employed to remove any remaining portions of the growth and to rid the face of the bone of any ragged remainder of the alveolar process. On the right side the antrum of Highmore was exposed. After the parts had been well washed out with pure phénol sodique, and hemorrhage was under control, the wound made in the lip was closed by using three ordinary hare-lip pins for the median cut and making a figure 8 with soft white cotton wrapping-twine around each pin. A few stitches were made to unite the alar cuts.

Treatment.—The lip was dusted with iodoform, and a piece of lint saturated with twenty-five per cent. solution of phénol sodique was placed over the pins and around the wings of the nose, a light bandage being used to hold the lint in place and to assist in protecting the parts. A mouth-wash composed of a teaspoonful of equal parts of compound tincture of capsicum and myrrh to a glass of water was frequently used. This preparation has a stimulating effect, and acts as a disinfectant. On Monday, two days after the operation, two of the pins in the lip and half the stitches were removed, and an adhesive strap placed across the lip to give it support. On the third day the remaining pin and all save two stitches were taken out. On the fourth day the remaining stitches were removed. The internal wound improved very rapidly,—so much so that in two weeks' time it was nearly covered over by new membrane, and the patient was in condition to have the

second operation performed, but on account of other pressing cases at the clinic it was deferred one week,—viz, until March 11.

FIG. 4.



Profile of patient before operation.

The Second Operation.—After the patient was etherized, the upper

FIG. 5.



Profile of patient after operation.

lip was found to be so relaxed that, together with the absence of the upper tumor, sufficient room was given for the ablation of the lower

one without external incision, although the engine-saw could not be used to so good advantage. The operation was performed otherwise like the first one, except that the tumor was divided in the center, and the right and left halves were taken out separately. Fig. 3 will show what was removed in two pieces, except the teeth marked *a, b, c, d, e, f*. The same mouth-wash was used as before. The parts quickly granulated, and were soon covered by new membrane, excepting one point, which gave considerable trouble; on passing a bistoury into it, a twelfth-year molar was found. It was left in for a time to see if the parts would tolerate it; but as it still gave trouble it was extracted, when the parts soon showed signs of getting well. The general hemorrhage in both operations was profuse, but none of the vessels were large enough to be ligated. A section of the tumor under the microscope showed it to be of a fibrous nature.

The patient writes, under date of April 28, seven weeks after the last operation, that the parts are entirely healed; his general health is very good, so that he is able to return to his work; that he finds less difficulty in articulating than he had previous to the operation, and that the improvement in his speech and general appearance is the subject of favorable comment by his friends. (See Fig. 5.)

A REGULATING CASE INVOLVING CORRECTION OF THE POSITION OF THE MEDIAN LINE OF THE ARCH.

BY NORMAN STURGES ESSIG, D.D.S., PHILADELPHIA, PA.

THIS case, which was that of a boy of fourteen years of age, presents some interesting features. First, as will be seen in Fig. 1, the cuspid was completely out of the arch, the lateral incisor and bicuspid

FIG. 1.



being in contact. Secondly, the central teeth were so much to the right of the median line as to constitute a deformity.

The two objects to be accomplished, therefore, were to correct the center line and bring the cuspid into its proper position in the dental arch. To accomplish this it was necessary to take out the first bicuspid

on the opposite side of the mouth, thus leaving a space which, if the median line were moved to its normal position, would be filled by the cuspid, which was in the position usually occupied by the lateral incisor. After the bicuspid on the right side of the mouth was extracted, an impression was carefully taken, and the model or cast thoroughly dried and well soaked with sandarac varnish. An excavator was then passed around the teeth, cutting away the plaster



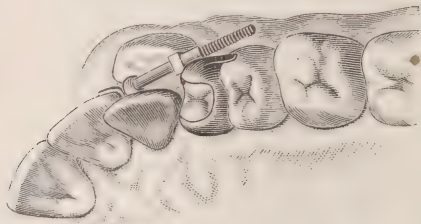
FIG. 2.

representing the gum margin, so as to allow the caps to extend a little under the free margin of the gum when the piece was put in the mouth. After this was done, the caps were made for the bicuspid and lateral incisor, as shown in Fig. 2.

These were made of twenty-two-carat gold, of about No. 30 thickness, and fitted snugly to the plaster, and in the case of the bicuspid the gold was carried up and just a little over the cusps, as shown in Fig. 3.

The cap for the lateral incisor was provided with a socket on the labial surface, into which the bar was fitted, allowing of some movement while the teeth were being pushed toward the median line. This cap was also provided with a small arm or lug, which bore against the adjoining tooth in such a manner as to prevent the capped tooth from being pushed out of line while the space between them was being enlarged, and insure the movement of all the teeth bodily toward the left. The nut, which was given one or two turns each day by means of a small wrench, was placed next to the cap on the bicuspid, which was provided with a cylindrical attachment through which the screw passed. The pressure caused by the tightening of the nut lengthened the screw, and thus widened the space for the reception of the cuspid.

FIG. 3.



A suitable wrench may be made from a discarded excavator; of course it is understood that no thread is needed inside the cylindrical attachment on the bicuspid cap, as it is desired that the screw as it is passed through should be free to respond to the pressure of the nut, Fig. 4. The cuspid came down into place as the distance between the bicuspid and lateral was widened, and when it was fully erupted a collar of gold was made which fitted up closely to the neck of the tooth, and a small loop of gold was soldered to the labial surface, to which was attached a rubber ligature, which helped to draw the cuspid into place more quickly. The ligature was attached to a little gold button on a small rubber plate.

As mentioned in a previous article, in the use of the screw and nut in connection with the cap used in regulation the force exerted is a

very positive one, and is not accompanied by the extreme soreness following the use of rubber ligatures and appliances where continuous or persistent force is brought to bear. In the case mentioned, the screw could have been used to draw the cuspid into place, but it would have been necessary to make some changes in the fixture, which would necessitate soldering the attachment for the screw to the caps, and

FIG. 4.



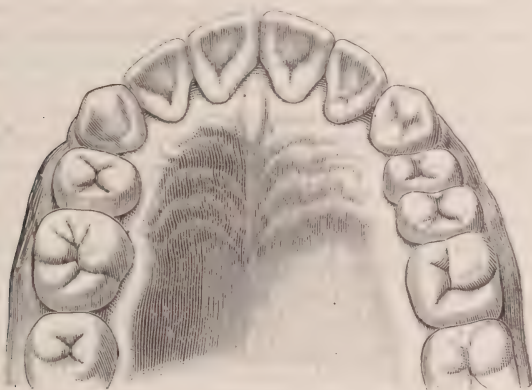
FIG. 5.



that would have necessitated removing the piece, which was undesirable, as it was important to maintain the space gained by it between the lateral incisor and first bicuspid.

After the space was enlarged to receive the cuspid it moved very rapidly, and in its downward course came in contact with the bar or screw, which was then removed and a curved one substituted (Fig. 5), which allowed the cuspid to pass inside, thus allowing it to continue on downward into the space prepared for it. The most remarkable feature of this operation was the quickness with which all the teeth

FIG. 6.



responded to the pressure as soon as the force was brought to bear on the lateral incisor. When the median line was brought to its normal position and the teeth in their proper place, the fixture was allowed to remain as a retaining piece for about three months.

This case was finished about two years ago, and since that time there has been absolutely no change in the position of the teeth, and their regularity is one of the noticeable features of the mouth. (See Fig. 6.)

CORRESPONDENCE.

DR. ARTHUR'S USE OF COBALT IN ROOT-FILLING.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—In your issue for May, on page 366, there is published the statement that "Gorgas's Dental Medicine says the late Dr. Robert Arthur preferred cobalt as a devitalizing agent [for dental pulps] to arsenious acid, being of the opinion that less irritation followed its action and consequently greater immunity from periosteal inflammation."

This extract must have been misquoted,* since the irritation following the application of any devitalizing agent has nothing to do with any subsequent periosteal inflammation, if it is anything of a devitalizing agent at all, short of actual traumatism.

Will you kindly permit me to say that, at some period of his life, Dr. Arthur may have preferred to use cobalt to arsenious acid for killing pulps, though I think not for the reason stated in the quotation. As a matter of fact, I am positive that he once gave it a trial, for he showed me some, on one occasion, with the remark, "I have found the action of this to be less reliable than is that of arsenic."

Should Professor Gorgas have been visiting Dr. Arthur while he was experimenting with cobalt, it is quite probable that it may have been when Dr. Arthur held for a time the opinion that he had had better success with it than with arsenic. But this idea was most certainly not maintained very long. I was Dr. Robert Arthur's associate for some time before the war. He confided freely to me all the details of his great specialty—the treatment of exposed pulps, and of the roots of dead teeth and filling them. Our conversations upon these subjects were of almost daily occurrence, and would be continued for nearly all the time we could spend together, for a long time after I went to him. It was the one thing which was nearest his heart of all the other branches of the profession.

He was a great man. Investigation into abstruse questions was a passion with him. It was only necessary for something supposed to be impossible of accomplishment to be brought to his notice to arouse him to immediate and persistent action in the direction of mastering it.

He was known the world over as the only practitioner of dental surgery whose root-fillings were successes invariably.

He was a very peculiar man in many other respects. It was almost impossible for any one who called upon him to find out his real opinions of any methods of procedure in any complications whatever. He always allowed his visitors, with the extreme courtesy which was such a strong characteristic of his, to say whatever they pleased without ever once attempting to controvert them. If the caller was a man of conspicuous ability in any particular, I was always sent for, intro-

* The statement referred to is found on page 170 of Gorgas's "Dental Medicine," fourth edition, 1893, and is as follows: "The late Dr. Robert Arthur preferred cobalt as a devitalizing agent to arsenious acid, being of the opinion that less irritation followed its action, and consequently greater immunity from periosteal inflammation."—ED. DENTAL COSMOS.

duced, and permitted to listen to his conversation, which Dr. Arthur guided and directed himself, generally, with simply a word here and there. I was allowed to see any defects in theories and practices afterward while we were alone.

He called at my office, in this city, shortly before his death, and I can assure you, and the readers of the DENTAL COSMOS, if you permit me, that the methods of destroying pulps which are those most commonly in use at the present time were those of which he most highly approved then, as he did all the time I was with him.

HENRY S. NASH, D.D.S.

53 W. THIRTY-THIRD STREET, NEW YORK CITY,
May 16, 1893.

ANCIENT INLAYS.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—Doubtless many of the readers of the COSMOS observed, several months since, in the public journals, the record of the death, by tropical fever at Copan, in Central America, of Professor John G. Owens, of Harvard. During the last two winters Professor Owens was engaged, under the auspices of the Peabody Museum, in making explorations and collecting data, by making excavations and by taking photographs and impressions of the marvelous and numerous anaglyphs about these ancient and mysterious urban remains of a forgotten civilization.

Having been acquainted with Professor Owens from his boyhood, I know him to have been a close and faithful observer.

While rendering him some professional service last summer, he told me that in making an excavation about the base of a teocali or pyramid, at Copan, he uncovered the skeleton of a man of more than ordinary stature. While carefully removing the bones for preservation, he observed the teeth dropping from the upper maxilla, and carefully gathered them. On examining a central, he was surprised to find on the labial aspect an inlay of green stone, nearly square, with round corners. Examining its mate, he found that it had also had an inlay, which had dropped out, exposing a red cement which had held it in place. A careful search in the soil brought to light the missing stone.

On questioning him as to whether these inlays might have been made for the arrestation of caries or for ornament, he gave it as his opinion that it was for the latter.

There may be said to be no data by which an age can be ascribed to these remains. Those who have read Prescott's histories will remember that when, three hundred and sixty years ago, Cortes made his famous expedition into Guatemala, he passed near these ruins, which were then the remains of a lost civilization, which differed from that of the Aztecs and the other nations of Anahuac. In connection with these inlays, the problem that presents itself is the same as that which confronted John S. Stephens fifty years ago, when he was making explorations about Copan. In the absence of all evidence that the men who made these sculptures had any knowledge of iron, of what material were their tools and instruments?

Stephens gave it as his guess that their only tools were the itzli or quartz implements, and Professor Owens stated that he had found some of these so small that the excavations in the front of the teeth might have been made with them.

These inlayed teeth with other objects brought by Professor Owens a year ago, and those just now brought home by his assistants, will be among the exhibits of the Peabody Museum at the Columbian Exhibition, and I have given these facts to the DENTAL COSMOS that the many dentists who will go to Chicago this coming summer may look for and examine them.

HENRY GERHART, D.D.S.

LEWISBURGH, PA.

JUSTIFIABLE TOOTH-EXTRACTION.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—During the discussion of the paper upon extracting teeth, etc., at the First District Society's meeting last February, I made a reference to Dr. Flagg's teaching which I wish to modify.

Dr. Flagg writes me that he has always, since he became a teacher, recognized a line in the numerous instances of incurable conditions affecting both teeth and roots, and I hasten to correct any injustice my remark may have done him.

I have no doubt the members present who heard all the discussion and took part therein thoroughly understood the intent of what was said ; but that there may be no misapprehension otherwise, I wish to say that I did not mean that Dr. Flagg or any one else taught that under no condition or circumstance should a tooth be extracted. I am too familiar with Dr. Flagg's practice and teachings to have intentionally given that impression.

What I wished to convey was that my understanding of the teachings in our colleges is, that it is desirable to save everything in the shape of a tooth which appeared to be of use ; that even a root is better than an edentulous gum, and that our young men usually came from college imbued with the idea of their ability, and with a determination to save every such tooth or root, and that this idea had established as a system of practice the prolonged and persistent treatment of many incurable alveolar abscesses, which was the main point of the subject under discussion.

In the hands of one so skillful as we all know Dr. Flagg to be, certainly no one would question the possibility of saving many of the almost hopelessly diseased teeth, any more than one would assert that every tooth could be saved to permanent usefulness ; but there are many teeth that are beyond the possibility of saving, and I feel there ought to be recognition of a line limiting the state of salvability.

J. D. THOMAS.

PHILADELPHIA, PA.

TRANSLATIONS.

ON THE TREATMENT OF DEAD AND INFECTED TEETH WITH POTASSIUM AND SODIUM (SCHREIER'S PREPARATION).

BY DR. E. SCHIFFMANN, PARIS, FRANCE.

(Translated from the *Schweizerische Vierteljahrsschrift für Zahnheilkunde*, March, 1893.)

IN the second and fourth numbers of the *Oesterreichisch-Ungarische Vierteljahrsschrift für Zahnheilkunde*, Dr. Schreier, of Vienna, described a combination of sodium and potassium prepared by him for the sterilization of dead teeth. Messrs. Weiss & Schwarz, of Vienna, sent me, a few months ago, a sample of this preparation, with the request that I should introduce the same in France. I have since then worked zealously with this method, and have treated at least forty cases, part in the Hospital of Children's Diseases and part in private practice.

Too little time, however, has elapsed to safely judge of the success of these cases. The result will not be clearly seen till a year has elapsed, yet I cannot restrain my pleasure at the superior results which I have had so far. If the future brings me no unpleasant surprises, I will consider potassium-sodium as the ideal for the consideration of every conservative dentist in the treatment of these cases.

For the details of the technic of employment of this new remedy I refer to the above-mentioned publication of Dr. Schreier,* and will mention a few cases where the advantage of this treatment is conspicuous.

1. A young student presented about five months ago with a palatal abscess, occasioned by a second upper bicuspid. The young man could only come for treatment once a week. I made a free incision into the abscess, drew all the matter out that was possible, cleansed the canal of the bicuspid, and pumped oil of cinnamon-cassia into the same. The cinnamon oil ran through and came out through the abscess. To close it, I placed a thread of cotton soaked in concentrated carbolic acid in the canal, and stopped the cavity with a pellet of cotton saturated with benzoic acid. After eight days the case remained the same, the abscess open and suppurating. Either the canal had not been sufficiently disinfected, or it had been reinfected during the week.

I repeated, in the course of the next three weeks, the same proceeding, without gaining any advantage from it. At the end I filled the tooth with Hill's stopping. Two days later I was called to the patient, whom I found suffering acute pain. I therefore had to remove the gutta-percha and replace the cotton.

At this time I received the Schreier's preparation. I therefore risked the new treatment, and filled the tooth with gutta-percha. After eight days I found the patient on the way to health. There was no more pain, and the cicatrization of the abscess was going on. Now, to-day, three months have gone; the tooth is filled with amalgam, and the patient can use it as before.

*See *Schweiz. Vierteljahrsschrift für Zahnheilkunde*; also DENTAL COSMOS, January, 1893, p. 22.

It certainly constitutes a great advantage over every remedy before known to us, to be able at one treatment to hermetically seal an infected tooth with abscess forming.

2. A young physician, a business friend, informed me that three months previously he was the despair of the dentists. He was treated by different good dentists for six years, with considerable intervals. The result had been most lamentable. Whether the failure was his fault or that of the dentist, I cannot determine, as I only heard his account of it.

The state of his mouth was as follows: All the incisors on both sides were carious, although there was but little caries on the lower incisors. Two bicuspid, three molars, and two wisdom-teeth were in the worst possible condition. The crowns scarcely projected beyond the edge of the gums; the canals were open, and naturally infected. I undertook to treat the teeth of the gentleman after an entirely new method, and in three sittings, at least, and afterward to cap the molars with gold crowns and the bicuspid with Darby crowns.

I treated these seven dead teeth in three sittings with Schreier's preparation, the wisdom-teeth without coffer-dam, and closed them with Hill's stopping. I might here add that I consider it very dangerous, and therefore imprudent, to undertake this treatment without the coffer-dam. I have burned my fingers with it before this in spite of all precautions, and consider it only by chance that the patient's mouth did so well in not being damaged. I must also mention that the first bicuspid had three canals, two natural and one artificial. Apparently, one of the dentists who had treated my patient had made this canal with a bur or drill, and had pierced through into the periosteum, so that I naturally, in the belief that I had found the canal, inserted the nerve-broach and tore the periosteum. The patient felt considerable pain for a moment, and there was much bleeding through the canal. Nevertheless, I treated this tooth as the others, and closed it also with gutta-percha.

After a month, the patient not having suffered the least pain, I proceeded to place my gold and Darby crowns in position. To-day the mouth is in a good hygienic condition, and every tooth useful for mastication.

3. The patient, an old lady, had two roots broken off deep under the gums and almost covered,—the right upper cuspid and first bicuspid. In the first sitting I cut the gum from around these roots, cauterized them, and placed pellets of cotton saturated with carbolic acid in them. On the next day I enlarged the canals of both teeth, and treated them with Schreier's preparation. I then took impressions to make two pivot teeth, which I fastened in the same afternoon. I saw this patient a few days ago, and have every reason to be pleased.

Of all my cases treated with Schreier's preparation, I have not had one disappointment, and I filled every tooth at the first sitting.

My treatment differs somewhat from that of Dr. Schreier. I published the same in the *Revue Internationale d'Odontologie* this year, and must here refer to that publication. Dr. Schreier writes that all his efforts to definitely fill the teeth at the first sitting have been failures; that after a few days there would be inflammation of the den-

tine and subgingival abscess would be formed, and he was convinced that the proceeding was not safe. Wherein the difference is, it is impossible for me to see; perhaps some difference in the method of treatment.

PROCEEDINGS OF DENTAL SOCIETIES.

SECOND DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

FOLLOWING is a report of the discussion on the paper, "The Value of Comparative Records," read by Dr. D. W. Barker at the meeting of April 10, 1893. The paper is printed in full at page 438 of the current issue.

Dr. L. M. Halsey. I would like to ask a question in regard to those broken drills; if Dr. Barker can tell the character of the drill, and in what position in the canal it was left, whether it was one-half, one-quarter, or three-quarters? The position of a broken drill, I think, is important with respect to the trouble that arises.

Dr. Barker. About two years ago we were speaking of that subject, and a great many of the gentlemen said, "We have broken them off often." I can't specify as to what particular teeth they were broken off in, nor the exact location. Sometimes we can get them out, and sometimes we can't. Sometimes you can push them to one side and go around them. I have drilled past them, and so was pretty sure of getting that root filled beyond the broken drill, although I could not get it out. As to the kind, they were Morey drills, not broaches. I find that most of them are broken off pretty well up toward the apex.

Dr. A. H. Brockway. I simply want to commend the paper. It is a fact that comparatively few dentists keep any record of their operations, so far as my observations go, and therein they make a very great mistake. Of course it takes some little time to keep a record, but on the whole I think it is a saving of time, for this reason: that if you keep a record of your operations, especially such cases where you can, if subsequent trouble occurs, by turning to your record very easily determine what the previous history of the tooth has been, you will save very much time, possibly, in making a diagnosis of the trouble. I have kept a record of all my operations ever since I practiced. I can tell by turning to the book just what was done with every patient, and it is a source of great gratification and advantage to me, and often to the patients, too. I commend this system of Dr. Barker's for its simplicity. I do not see how it could very well be improved upon. It certainly is very simple. The record I have kept has not been a record so much of the previous condition of the teeth, or the specific treatment which they have undergone, as of the operations which have been performed; for instance, of a filling, of the location of the filling, of the material of the filling, the character of it, etc. Of course in pulpless teeth the record shows that the pulp has been removed, and it also shows whether the pulp was alive previous to the removal or not.

Before I sit down, I will speak a word on this accident of breaking drills in roots. When it has occurred to me I have been very much alarmed, and spent a great deal of time in endeavoring to remove the

broken piece ; but I have never been very successful in removing it, and for the last ten or fifteen years I have never taken any pains to remove it, unless it was so that I could readily reach the broken piece and withdraw it. My experience has shown that they do no harm. I think in one case a broach was broken off in the root. In those days we used to fill the roots with gold, and the result was that the broken nerve-broach rusted somewhat and stained the tooth a beautiful dark blue. It was a central incisor. I have seen a great many teeth stained that had no broken broaches in them. And speaking of the broken broach in the root, many of you will remember that a dentist in St. Louis years ago practiced that method of filling roots. In those days they did not have the simple methods that we have, and the filling of a root was a very serious affair ; but this man devised a plan of forcing the nerve-broach up and breaking it off, and leaving it there for a permanent filling. When I have broken a broach or drill in the root, I thoroughly disinfect it with carbolic acid and force gutta-percha up, and I have never had any trouble which I could attribute to the broken drill. In seeking to remove them I have tried the introduction of iodine, but there is no use in anything of that kind.

Dr. O. E. Houghton. I can testify as far as the value of the record is concerned. I have kept a complete record of everything that I have ever done since 1879. I had another record before that, which was destroyed. I have a record of my own devising, of which I have brought a sample, and offer members of this society the cuts if they wish them. There is hardly a day but that I find my record to be of infinite value to me.

I have records of several instances of broken nerve-broaches and drill-heads in pulp-canals, and never have had a single instance of trouble from them yet. I see every day a central incisor that I crowned about six years ago, and at the end of that root there is a broken-off drill-head ; yet that tooth is as sound and strong as any the patient has. I had a case twenty-two years ago where I broke off quite a large piece of steel in the canal of a cuspid. I have forgotten why that tooth had to be removed. I think pyorrhea was the cause ; but nearly ten years after I had broken the instrument off I removed the tooth myself and found that the entire root was black and blue. I found no iron there, but plenty of oxid ; but I didn't find a remnant big enough to put under a microscope.

Dr. Halsey. I have a case in hand with four Richmond crowns on the upper incisors, inserted by a good dentist, and one of the centrals had been ulcerated for four years with the crown in position. The patient had decided to have the crown taken off, which I did ; in working my way up to the end of the root I found an obstruction, and at last I managed to reach the end of a drill. I got it out and replaced the crown, after getting the root in a healthy condition. The roots holding the other three crowns are perfectly healthy, but this one was abscessed, and I think it was caused by the drill-head or the material above it.

Dr. R. Ottolengui. I would like to tell the gentlemen a little trick about broken drills, which is not original with me, but which has been very useful to me. If you are using a Glidden drill it can be remembered that all Glidden drills are of the same length ; so if you have broken off one, take the broken shaft, compare it with a perfect

one, and you can discover how much of the drill is in the canal. Then if you take the broken drill and lay it on the tooth, you can get an idea of just how far it went into the root. If it is very far up, you may as well leave it. If not far up, you can generally do what Dr. Barker says,—drill past and fill beyond it.

Dr. Houghton. About a month ago I had occasion to treat a left central, for the purpose of crowning, that had half the natural crown broken off. I make this statement simply to show you that cotton root-fillings sometimes do work very nicely. The lady stated that the filling had been in position twenty-five years. I removed the gold filling and cut off the crown. It was a very large crown. I found the canal packed with cotton, which came out sweet and clean, after having been there for twenty-five years.

Dr. W. Jarvie. Very rarely do I fill a root with anything but cotton. I think I can fill a root better with cotton than I can with any other substance that I know of. I get the length of the root as nearly as possible on an instrument, and cut the first piece of cotton, which is a very small piece, saturate it with creasote, and carry it as near to the end of the canal as possible; pack that firmly into place, and then follow it up with small piece after piece, the pieces depending upon the size of the canal. Each piece of cotton is packed solidly.

After the first piece, I depend upon the carbolic acid that is already in the root to keep the rest from decomposing. I think if you get the end of the root firmly sealed up, it matters very little what the rest of the root is, although I do try to get the cotton packed very thoroughly there. I have taken out cotton that has been in such roots for years, when the cotton was just as sweet as when put in. I think I have a record of every tooth I ever filled since I commenced to practice dentistry—since the year 1864. I keep a record of every tooth I fill, with the exception of temporary teeth for children,—I do not do that,—and if the root is filled, the material that it is filled with, and any little remarks that I may want to make for future reference. I don't keep as complete a record as Dr. Barker has shown us here. My record is more valuable, perhaps, in refuting the imagination of the patient than in any other way. The patient might say, "The tooth you filled for me last year has lost its filling," and possibly I could not say that I had not filled it last year. Whenever anything of that kind is said to me, before I say anything in reply, out comes my book. The patient, while yielding apparently to my positive statement that I had not filled it, might mentally feel that I was mistaken; but the record is proof positive. In such cases patients might lose confidence were it not for the records. In fact, too much cannot be said of the value of the record, and a record of root-filling is particularly valuable. I find, too, sometimes there are some roots that I cannot fill; for example, the buccal roots of superior molars, I may say, I hardly ever fill. One gentleman in the First District Society told us that he did it with ninety-nine cases out of a hundred without any trouble; and even if he had trouble with the other of the hundred, he did it, and never failed. I think perhaps I may succeed in one case out of a hundred with those roots. Now about the broaches and drills. I was surprised to hear that it is a very common thing to break the drills. The essayist tells us that he broke twelve drills out of one hundred and fifty-four cases. I don't break any such number

as that. About a month ago I broke a drill off in a cuspid. It hurt my feelings very much, and I was pleased in being fortunate enough to get it out. I don't believe I break an instrument off in a root in a year. I am very careful. I only use my broach a few times. I won't use a broach in a canal where I think it has had any strain at all. I am very, very careful.

Dr. Brockway. I have not broken off such a great proportion of drills in the cases I have had as might be inferred. I used to break them off occasionally until I knew better how to use them, for the reason that instead of using the largest-sized drill first I commenced with the very small ones. I supposed that I ought to use a small drill first, and then gradually enlarge the size; but I found from Dr. Morey that that is not the way that drills should be used. You should begin with the largest you can, and then take the next size smaller, and so on until you complete an operation. Experience has shown that a broken drill is not a matter to be regarded with great anxiety.

Dr. F. T. Van Woert. Most of the members present know that I have been keeping a record for some time, and that I give my patient a record. I have a record of every operation that is done in my office, and the charges therefor; that I keep and number, and a duplicate with the corresponding number goes to the patient; and I am free to confess that if there is anything about my office that I would have to give up, I would want the last thing to be my record-book, and particularly the book that has the stubs and charges to go to the patient. I believe the better record that we keep and the more we let our patients know,—the best way is to give them a record,—the better off we will all be. I want to say, in reference to the drills, the few Morey drills that I have used have been very unsatisfactory; but the Gates-Glidden drills are certainly very evenly tempered, and I don't remember having broken anything like as many, proportionately, as Dr. Barker speaks of.

Dr. Houghton. I would say that for years it has been my practice to have on my bill-heads a diagram of the upper and lower sets of teeth,—a duplicate of my record-book. When I feel that the patient wants to have a record of what has been done, I make a record on the bill when it is rendered.

Dr. Van Woert. Some of my patients object to having the chart and bills together. Some want work done, and don't want it known that it has been done.

Dr. W. H. Johnston. It seems to me that the talk that has been given on this paper has very little to do with the paper. The records that have been kept by these gentlemen who have spoken are entirely records for themselves and their patients, or for themselves to collect their bills by. The paper and the method of records which is proposed to keep in the paper by the essayist of the evening is not for that purpose at all. It is a comparative record, to show to himself, or to the profession for their benefit, the comparative value of different methods of treating. That I believe to be a point which, if followed up by the members of the society, would be of great benefit, not only to the one who should do that, but to the rest of us. I did not expect to say anything about it, but the comparison between the paper and the records of the gentlemen who have said that they are keeping records is so entirely different in every respect that I thought

it would be well to call attention to that fact. I think it is well to commend every one who will keep with care any such a record as this. I believe that most of us, when we start out, do so with the determination to do just such a thing as this. I remember the first paper that I ever prepared was in very much the same line as this, and I thought I would keep a record of everything that I did, so that by and by it would be a great benefit to the profession and myself. My experiment has been of some benefit to me, but I have failed so much in the persistence of well-doing that I am fearful that it will never be of any benefit to the profession. As to the breaking of drills, the only case that I can call to mind is one which, after treatment without success and not being able to get through the root, I found a breach by drilling through the fistula. It was not mine, and I had no idea it was there. It was driven up through the foramen.

SOCIETY OF THE ALUMNI, DEPARTMENT OF DENTISTRY, UNIVERSITY OF PENNSYLVANIA.

THE Society of the Alumni held its thirteenth annual meeting, Tuesday, May 9, 1893, at the Stratford, Philadelphia, Pa. Owing to the absence of the president, Dr. Grafton Munroe, Springfield, Ill., and the recent death of First Vice-President Dr. W. F. Rehfsuss, Philadelphia, the meeting was presided over by Second Vice-President Solomon Freeman, New York.

A roll-call showed the presence of twenty-five members and numerous guests, among whom were the provost and members of the faculty.

A resolution was passed to hold a meeting in Chicago during the continuance of the World's Columbian Dental Congress; also a resolution recommending that chief demonstrators be elevated to the position of associate lecturers, and that the secretary be instructed to correspond with the authorities of the department relative to such a step. A committee was appointed to draft suitable resolutions for the society in regard to the death of its First Vice-President, Dr. Rehfsuss.

In addition to the business meeting, the program was as follows:

"Diaphtherin in Dental Practice," by John Berger, D.D.S., Görtitz, Germany. Read by Dr. W. E. Christensen.

"Practical Hints," by S. Freeman, D.D.S., New York.

"Our Alumni Organization, suggestions in regard to its importance and usefulness," by G. L. Curtis, D.D.S., M.D., New York. Read by Dr. Meyer L. Rhein.

Annual oration, "Habit," by Boyd H. Baker, D.D.S., Wilmington, Del.

Dr. Berger's paper dealt with the new antiseptic, diaphtherin, which has been discovered but a few months. It is a combination of oxy-quinolin and aseptol, a powerful antiseptic, having a slight carbolic odor, but differing essentially from carbolic acid in its being entirely non-escharotic. It does not discolor tooth-structure, is free from objectionable odor, and seems to possess in an eminent degree the power to check and control putrefactive change by its mere presence.

Dr. Berger cited cases in which for experiment he had tested the substance in this particular by inserting a mixture of the powder diaphtherin and water in the pulp-chamber of devitalized teeth, both of recent extirpation and where sloughing had occurred, and in nearly every instance there was no disagreeable reaction. He also cited experiments in this line that were made by the discoverers themselves.

While too soon to positively assert its value and importance as an antiseptic in dentistry, Dr. Berger feels justified, from his own experiments and knowledge obtained from others who had experimented with diaphtherin, that it is bound to soon occupy a very important place in dental medicine.

All the papers, together with the proceedings of the meeting, original communications, correspondence, etc., will appear in the next issue of the *Alumni Annual*, a publication devoted to the interests of and published by the society, and a copy of which is placed in the hands of every graduate of the department.

The committee having this work in charge is composed of the following members : Drs. Winner, McFadden, Seip, and Rhein.

The officers for the ensuing year are : Dr. S. Freeman, New York, president ; Dr. C. W. Crankshaw, Norristown, Pa., first vice-president ; Dr. B. H. Baker, Wilmington, Del., second vice-president ; Dr. F. A. Peeso, Philadelphia, third vice-president ; Dr. W. L. Winner, Philadelphia, recording secretary and treasurer ; Dr. H. B. McFadden, Philadelphia, corresponding secretary ; Dr. L. Foster Jack, Philadelphia, member of executive committee.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

At the annual meeting of the First District Dental Society, held Tuesday evening, April 11, 1893, at the New York Academy of Medicine, Dr. John H. Meyer exhibited an upper and lower set of teeth which had been worn by General George Washington, concerning which he made the following statement :

The sets of teeth which I have with me were intrusted to me by the faculty of the Baltimore Dental College, and I have thought the members of this society would be interested to see them. They were made for the "father of our country" by Dr. Greenwood, of New York city, and presented by his grandson to the late Dr. John Allen, who subsequently presented them to the Baltimore College. The upper case is of gold, and is, I think, one of the first plates swaged between metal dies. An extra thickness of gold was soldered over the alveolar ridge, in which nine holes were drilled, and in this thickened portion wooden pins were inserted. The teeth were carved out of hippopotamus bone, in two sections of six teeth from central incisor to molar, and in each section holes corresponding to the pins or plate were drilled, by means of which they were set on to the plate and held in position. The lower case had no gold base, but was carved out of one piece of hippopotamus bone, being raised at its terminal ends to represent a molar tooth on each side ; in front of each molar, blocks of five teeth carved from the same material were set on wooden pins in the same manner as on the upper plate. Spiral springs were attached to the upper and lower sets to hold them in position in the mouth.

WOMEN'S DENTAL ASSOCIATION OF THE UNITED STATES.

THE regular monthly meeting of the Women's Dental Association was held May 6, 1893, at 4004 Chestnut street, Philadelphia. Dr. Emma E. Musson read a paper on the subject, "The Pathological Relations between Throat, Ear, and Eye." The next meeting will be held at 117 North Seventeenth street, Philadelphia, June 3, 1893.

ELIZA YERKES, *Recording Secretary*,
4004 Chestnut street, Philadelphia.

COLORADO STATE BOARD OF DENTAL EXAMINERS.

THE Colorado State Board of Dental Examiners met at the Denver Dental College, Monday, April 17, 1893, organized, and elected the following officers: Dr. J. N. Chipley, Pueblo, president; Dr. C. N. Guyer, Denver, secretary; Dr. G. A. Dillie, treasurer.

The board is composed of five members, and holds office for two years.

C. N. GUYER, *Secretary*.

GEORGIA STATE DENTAL SOCIETY.

THE twenty-fifth annual meeting of the Georgia State Dental Society was held at Atlanta, May 9, 10, 11, and 12, 1893. The following officers were elected for the ensuing year: N. A. Williams, Valdosta, president; W. W. Hill, Washington, first vice-president; C. V. Rosser, Atlanta, second vice-president; H. A. Lowrance, Athens, treasurer; S. H. McKee, Americus, recording secretary; O. H. McDonald, Griffin, corresponding secretary. Examining Board, J. H. Coyle, Thomasville; D. D. Atkinson, *secretary*, Brunswick; A. G. Bouton, Savannah; B. H. Catching, Atlanta; H. H. Johnson, Macon. Executive Committee, H. B. Jewett, *chairman*, Atlanta; S. B. Barfield, Macon; D. Hopps, Savannah; E. L. Hanes, Jr., Cedartown; W. S. Simmons, Guyton.

The next meeting will be held at Tybee Island, Ga., in June, 1894.

O. H. McDONALD, *Corresponding Secretary*.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF BUFFALO—DENTAL DEPARTMENT.

THE first annual commencement exercises of the Dental Department of the University of Buffalo were held, in connection with those of medicine and pharmacy, in Music Hall, in the city of Buffalo, on the evening of May 2, 1893.

The examinations before the board of curators, which comprises the Dental Examining Board of the State, lasted during the day. After these were finished the board held a meeting with doors closed to all, and after thoroughly canvassing their merits, unanimously recommended each of the candidates as well qualified to receive his degree, which was conferred upon him by the chancellor in the evening.

The number of matriculates for the session was forty-six.

The graduates were as follows, each having presented senior tickets from some reputable institution before joining the class :

NAME.	STATE.	NAME.	STATE.
William J. Crawford.....	Ohio.	William Charles Smith.....	California.
Edward Harry Lamport....	New York.	Daniel Hubbard Squire....	New York.
T. DeForest Phillips.....	New York.		

COLUMBIAN UNIVERSITY—DENTAL DEPARTMENT.

THE sixth annual commencement of the Dental Department of the Columbian University was held, in connection with that of the medical department, at Albaugh's Opera House, Washington, D. C., on Thursday, May 4, 1893, at 2.30 P.M.

The address to the dental graduates was delivered by Professor Henry C. Thompson, D.D.S., and the valedictory by Edward G. Seibert, M.D.

The number of dental matriculates for the session was forty-four.

The degree of, D.D.S. was conferred on the following graduates by J. C. Welling, LL.D., president of the university :

NAME.	STATE.	NAME.	STATE.
Charles W. Appler.....	Maryland.	Robert L. Nall.....	Kentucky.
William N. Cogan.....	Dist. of Col.	N. Willis Pomeroy.....	Dist. of Col.

UNIVERSITY OF PENNSYLVANIA—DEPARTMENT OF DENTISTRY.

THE fourteenth annual commencement of the Department of Dentistry of the University of Pennsylvania was held at the American Academy of Music, Philadelphia, Pa., on Wednesday, May 10, 1893.

The valedictory address was delivered by William F. Norris, M.D., professor of ophthalmology.

The number of dental matriculates for the session was one hundred and fifty-three.

The degree of D.D.S. was conferred on the following graduates by William Pepper, M.D., LL.D., provost of the university :

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Walter B. Adams.....	Pennsylvania.	Charles F. Keim.....	Nebraska.
Edward P. Betts.....	Pennsylvania.	Charles W. Neebe.....	South Africa.
Frank J. Cahill	New Jersey.	Guillermo Regardis.....	Venezuela.
Elton C. Goodfellow.....	Pennsylvania.	John R. Ricker.....	Texas.
Antony Henneberg.....	Switzerland.	Jaky Rosen.....	Tennessee.
Samuel Henneberg	Switzerland.	William T. Sherman.....	Pennsylvania.
Edward H. Hicks.....	Pennsylvania.	Frank K. Stevens.....	Pennsylvania.
Franklin M. Keffer.....	Pennsylvania.	A. Vergel de Dios.....	Philippine Is.

JUNE 16, 1892.

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Stephen H. Carey.....	Pennsylvania.	M. N. Samaniego.....	Mexico.
Henry Elfers.....	Germany.	D. Everett Taylor	Connecticut.
Achille R. Nicodemi	Italy.		

NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

THE graduating exercises of the Northwestern University Dental School were held on the afternoon of April 25, 1893, at Central Music Hall, Chicago, Ill. Six students were graduated, as follows :

Benjamin Merrill Ford.
Jared Michael Garman.
Charles Hazen Gale.

Murry Gorden Matteson.
Philip Albert Pyper.
Charles Arthur Templeton.

DENTAL SOCIETY ANNOUNCEMENTS.

WORLD'S COLUMBIAN DENTAL CONGRESS.

CIRCULAR FROM THE GENERAL EXECUTIVE COMMITTEE.

To the Dentists of the United States of America, Canada, Mexico, Central America, and South America, Greeting :

The movement to hold a Dental Congress in Chicago, Illinois, August 14-19, 1893, inclusive, received its official status from the joint action of the Southern Dental Association at its meeting in July, 1890, held at Atlanta, Georgia, and the meeting of the American Dental Association held at Excelsior Springs, Missouri, in August, 1890. The undersigned General Executive Committee was appointed by the two associations to adopt rules and regulations, fix the time for convening the congress, secure the place for holding the sessions, and make such other preliminary arrangements as it deemed necessary.

The work of appointing committees to promote the success of the congress is finished, the permanent officers have been chosen, the honorary officers have been appointed in all foreign countries, and the time and place of meeting fixed.

A general invitation has been issued, asking the co-operation of the reputable dentists of the civilized world to meet with the dentists of the United States of America at the time and place fixed, for the presentation of papers, both scientific and practical, covering the entire range of theory and technology. It is believed that the newest investigations, discoveries, and methods in physiology, histology, bacteriology, pathology, oral surgery, chemistry, materia medica, therapeutics, orthodontia, operative dentistry, prosthesis, and deontology will be presented to this congress in a manner not heretofore attempted in any international gathering of a similar character.

It is with pleasure, therefore, that we appeal to the dentists of America to assist in this great undertaking, which promises so much for the future of dentistry and dental surgery, in placing its practical and humanitarian objects before the public at large. This congress will be an educator of such vast proportions to the practitioners of dentistry, that few can realize the direct benefits which will accrue, not only to those participating, but to those who deny themselves the opportunity to make history for the generations yet to follow.

The Transactions, when printed, will be a permanent record of scientific development that may well serve as a starting-point in future professional advancement, education, legislation, and prophylaxis.

Nothing will be omitted to provide for the comfort and entertainment of those who lend their presence for the furtherance of the objects of this congress, and a program of such literary merit will be presented as shall reflect in the clearest manner the past history and present development of dental

science, including also the practical demonstration of every phase of operations known. These demonstrations will be made by those best fitted by native ingenuity, education, and technical skill in bacteriology, histology, pathology, oral surgery, and other more directly practical subjects, such as orthodontia, prosthesis, electricity, and mechanical operations on the teeth, jaws, and associate parts.

The facilities for meetings and clinical demonstrations are ample to accommodate all who are entitled to admission to the congress. The Memorial Art Palace is situated near the center of transportation, it is isolated from traffic, and is well lighted and ventilated.

The general headquarters will be located at 300 Michigan avenue, within ten minutes' walk of the assembly-rooms. All communications to the secretary of the General Executive Committee to be sent to this address after July 15.

The profession in America must now assume the responsibility of making this congress a success, on the lines laid out by the General Executive Committee. This can only be accomplished by the immediate response of those who contemplate being present in person, or by contribution, financial or otherwise.

The committee urgently requests an immediate decision from those purposing to attend, in order to facilitate the work of the various departments, and reduce to a reasonable certainty the attendance from America.

Contributions of money should be made directly, and at once, to the chairman of each State Finance Committee, for transmission to the treasurer, who will issue his receipt for the same. Accompanying this circular are the codified rules and regulations of the congress, and instructions for the guidance of all.

Read this circular carefully, and preserve it for future reference. Adherents of the congress will address letters of inquiry to the secretary of the General Executive Committee, in order to receive an official reply.

Cordially and fraternally yours,

W. W. WALKER, *Chairman of the General Executive Committee*, 67 W. Ninth street, New York city, New York.

A. O. HUNT, *Secretary of the General Executive Committee*, Iowa City, Iowa.

L. D. SHEPARD, *President of the Congress*, 330 Dartmouth street, Boston, Massachusetts.

A. W. HARLAN, *Secretary-General of the Congress*, 1000 Masonic Temple, Chicago, Illinois.

JOHN S. MARSHALL, *Treasurer*, Venetian Building, Chicago, Illinois.

W. J. BARTON, Paris, Texas.

L. D. CARPENTER, Atlanta, Georgia.

J. Y. CRAWFORD, Nashville, Tennessee.

M. W. FOSTER, 9 Franklin street, Baltimore, Maryland.

H. J. MCKELLOPS, 2630 Washington avenue, St. Louis, Missouri.

G. W. McELHANEY, Columbus, Georgia.

H. B. NOBLE, New York avenue, Washington, D. C.

JOHN C. STOREY, Dallas, Texas.

C. S. STOCKTON, Newark, New Jersey.

J. TAFT, 122 West Seventh street, Cincinnati, Ohio.

Members of the General Executive Committee.

FINANCES.

Desiring that every reputable member of the dental profession shall be identified with the congress,—

Resolved, That a payment of ten dollars (\$10.00) shall entitle one to the Transactions and to membership, if eligible ;

That a payment of twenty dollars (\$20.00) shall entitle one to the Transactions and to membership as above, and to the commemorative medal ;

That a payment of thirty dollars (\$30.00) or upward shall have all the advantages of the twenty dollar (\$20.00) subscription, and also recognition as a contributor to the financial success of the congress ;

That any student presenting a certificate from the dean or secretary of a reputable dental college shall be entitled to student membership, and also to a copy of the Transactions, on the payment of five dollars (\$5.00).

RULES AND REGULATIONS.

All public announcements for the General Executive Committee shall bear the signatures of both the chairman and the secretary.

The admission fee to the World's Columbian Dental Congress shall be fixed at ten dollars, to be collected only from residents of the United States.

All papers to be read before the congress shall be in the hands of the Committee on Printing Transactions not later than July 1, and shall not exceed forty-five minutes in the time of presentation. Said committee shall have full power to accept or reject any paper, to revise, or suggest a revision by the authors, and to publish or not in the Transactions the whole or parts of papers read, or abridgments thereof.

The official languages of the congress shall be English, French, Spanish, and German, and the papers shall be printed, in the Transactions, in the languages in which they are read.

After a paper has been accepted, the committee shall prepare a brief synopsis, to be published in the official languages of the congress.

The chairman of each committee shall send reports of its progress to the chairman and secretary of the General Executive Committee at such frequent intervals as will keep them informed of all the work accomplished.

All circulars issued by any committee must be sent to each member of the General Executive Committee, and they shall be of uniform size,—viz, that of the minute forms issued by the secretary.

The Dental Congress offers a medal for the best popular paper on Dental Hygiene, for public distribution ; to be referred to Committee No. 23, to be called the Committee on Prize Essays.

All matters of business presented at the general sessions of the congress shall be referred to the General Executive Committee, and must receive the indorsement of the committee before they can be entertained by the president of the congress.

The management of the World's Congress Auxiliary of the Columbian Exposition have offered suitable accommodations in the Memorial Art Palace, on the lake front, in Chicago, for the sessions of the World's Columbian Dental Congress, August 14, 1893.

INVITATION.

The duties of the Committee on Invitation shall be to invite such scientific persons residing in the United States and foreign countries who are not mem-

bers of the profession, but who by their recognized attainments in special departments of science would add interest to the meeting. They shall also have the authority to invite such dentists of high standing and reputation in foreign countries as may be agreed upon by a majority of the committee, and a card from the chairman of said committee to the chairman of the Committee on Registration shall be deemed evidence of the reputability of the holder thereof to entitle him to membership in the congress, and they shall also furnish the Committee on Membership with a list of the names and residences of those invited.

MEMBERSHIP.

The duties of the Committee on Membership shall be to pass upon all applications for membership which may be referred to it by the Committee on Registration or the treasurer.

The membership shall consist of legally qualified and reputable dentists (as defined in the Code of Ethics of the American and Southern Dental Associations) residing in the United States, and such other scientific persons as may be invited by the Committee on Invitation; each and every member to be entitled to one copy of the Transactions.

All dentists residing in foreign countries who desire to acquire membership in the congress will file their application with the honorary president or vice-presidents of their respective countries, who are empowered to pass upon their eligibility.

When applications are satisfactory to the honorary president or vice-presidents, or a majority of them, in said country, the names so agreed upon shall be transmitted by July 15, 1893, to the chairman of the Committee on Registration, who will proceed to issue a membership card without further reference.

COMMITTEE ON ESSAYS, WORLD'S COLUMBIAN DENTAL CONGRESS.

NOTICE.

THE Committee on Essays of the World's Columbian Dental Congress request that as far as possible all authors who intend submitting essays to be read at the congress will do so at the earliest possible moment, so that the work of the Program Committee and of the Committee on Printing Transactions may not be delayed.

The committee also desire that each author will prepare a synopsis or syllabus of his paper, giving briefly his topic, his lines of argument, illustrations, conclusions, etc., to be used in preparing discussions both beforehand and at the time of the meeting. The synopsis and paper to be sent together to the chairman of Committee on Essays.

EDWARD C. KIRK,
Lock Box 1615, Philadelphia, Pa.

INTERNATIONAL MEDICAL CONGRESS.

NOTICE is given of the following reduction in fares to members of the International Medical Congress to be held in Rome from September 24 to October 1, 1893:

The *North German Lloyd*, 2 Bowling Green, New York, offers a reduction of 25 per cent. on steamer "Werra," which is to sail from New York on

August 5 and September 9, and on steamer "Fulda," on August 19. Both these steamers sail to Genoa. The same reduction will be made for the return trips in October and November, on the same steamers, and for the company's Saturday (off Bremen, Sunday off Southampton) steamers.

The *Hamburg-American Packet Co.*, 37 Broadway, New York, 125 La Salle street, Chicago, offers a reduction of 25 per cent., both out and return, for all its steamers during the year 1893.

The *Compagnie Générale Transatlantique*, 3 Bowling Green, New York, offers the rates which are allowed French officers,—that is, \$63.50 for an \$80 accommodation and \$91.50 for a \$120 accommodation.

The provisional committee has made arrangements with the different companies, whereby special reduced prices have been granted on the railways of the countries which the members of the congress are to traverse.

AMERICAN MEDICAL ASSOCIATION.

THE forty-fourth annual session of the American Medical Association will be held in Milwaukee, Wis., June 6, 7, 8, and 9, 1893.

In the Section on Dental and Oral Surgery the following papers will be read:

Dr. Edgar Palmer, "Medication in Dental Practice."

Dr. G. H. McCausey, "Caries and Necrosis."

Dr. Benson, "The Enemies of the Human Teeth."

Dr. E. L. Clifford, "Infection of the Mouth."

Dr. M. H. Fletcher, "Empyema of the Maxillary Sinus."

Dr. V. H. Latham, "Diseases of the Jaws."

Dr. E. S. Talbot, "Fallacy of Ivy's Theory of the Vault, Jaws, and Gums being Influenced by Temperament."

Dr. Geo. V. Brown, "Practical Oral Therapeutics."

Dr. A. E. Baldwin, Address.

A. E. BALDWIN, *Chairman.*

E. S. TALBOT, *Secretary.*

COLORADO STATE DENTAL ASSOCIATION.

THE Colorado State Dental Association will convene the first Tuesday in June, in Denver, and hold its session three days. A very interesting program is arranged, and a large attendance is expected. All dentists are cordially invited. The present officers are J. M. Norman, D.D.S., Denver, president; J. H. Beals, D.D.S., Denver, first vice-president; Robert Kettner, D.D.S., Trinidad, second vice-president; W. A. Smith, D.D.S., Salica, recording secretary; Sarah May Townsend, D.D.S., Denver, corresponding secretary; William Smedley, D.D.S., Denver, treasurer; M. A. Bartleson, D.D.S., Denver, H. E. McCarey, D.D.S., and R. B. Weiser, Georgetown, executive committee.

SARAH MAY TOWNSEND, *Corresponding Secretary*, Denver.

MICHIGAN DENTAL ASSOCIATION.

THE annual meeting of the Michigan Dental Association, which was to have been held at Ann Arbor in June, has been postponed until June, 1894.

J. WARD HOUSE, *Secretary.*

CALIFORNIA STATE DENTAL ASSOCIATION.

THE next annual meeting of the California State Dental Association will be held in San Francisco, Tuesday, June 13, 1893, continuing four days, at the rooms of the Dental Department of the University of California, corner of Taylor and Market streets. All members of the profession are invited to be present.

W. Z. KING, *President*, 1001 Valencia st.

L. VAN ORDEN, *Recording Secretary*, 14 Grant ave.

MISSOURI STATE DENTAL ASSOCIATION.

THE twenty-ninth annual meeting of the Missouri State Dental Association will be held at Excelsior Springs, Mo., July 11, 12, 13, and 14 inclusive. All dentists are invited to attend the meeting, which promises to be of great value to the profession.

WM. CONRAD,

321 N. Grand ave., St. Louis, Mo.

PENNSYLVANIA STATE DENTAL EXAMINING BOARD.

THE Pennsylvania State Dental Examining Board will meet for the transaction of business at Cresson, Pa., on Tuesday, July 11, 1893, and will continue in session for one day only.

WM E. MAGILL, *President*, Erie, Pa.

J. C. GREEN, *Secretary*, West Chester, Pa.

MINNESOTA STATE BOARD OF DENTAL EXAMINERS.

A SPECIAL meeting of the Board of Dental Examiners of the State of Minnesota will be held at the medical department of the university, in Minneapolis, July 6, 7, and 8, 1893. All desiring to take the examination for license are requested to give early notification.

HENRY A. KNIGHT, *Secretary*,

Masonic Temple, Minneapolis, Minn.

EDITORIAL.

THE PROFESSIONAL STATUS OF DENTISTRY.

IN a previous issue the educational possibilities of the World's Columbian Dental Congress were editorially alluded to, also the opportunity which that meeting will afford for a comparison of views concerning the unsettled questions pertaining to dental education, especially with respect to the relationship which should subsist between dentistry and medicine. The Dental Congress is an organization *sui generis*, having no continued existence as a corporate body. Its sole

object is to set forth the existing condition of dental science and art at the time of holding the meeting. It is not handicapped by any creed or dogma. It is open to all reputable practitioners, who are freely invited to take an active part in its work by presenting their views or contributing in whatever manner or degree they can to the total result. The circular issued by the Executive Committee, which we print elsewhere, gives all needful information for those who wish to become identified with this work. The success of the meeting as measured by the number and character of essays, clinics, exhibits, etc., is fully assured; its complete success should, however, include a discussion of the question of the status of the dental practitioner as related to the status of other special practitioners of the healing art. It is of course admitted that no legislative act by any body of men, either in dentistry or medicine, can officially settle this question pro or con. This can only be done by so harmonizing the educational bases of the respective professional superstructures that no grounds for division will exist. But the Dental Congress furnishes an opportunity which has heretofore never presented itself for defining what the attitude of a majority of dental practitioners and teachers, or at least the dental profession of America, shall be in relation to this question. It is not an easy matter to formulate the problem so that it can be discussed as a single topic. The trite question, "Is dentistry a specialty of medicine?" conveys but a partial view of the situation, for even when it is settled in the affirmative the question immediately arises, How shall the dental student be educated with reference to that view? It may seem perfectly clear to those who believe that every dental student should first pursue the complete medical curriculum and then add the special dental training to fit him for his life-work; but apart from the difficulty presented by this extended period of studentship, which to many is an insurmountable obstacle, does such a course produce the best kind of dental practitioner? Is he the best equipped for practice as a dentist? Has not the first impress which his medical training made upon his mind, after all, caused him to see his dental work through medical spectacles, and so made of him essentially a medical practitioner with a dental penchant, as it were? Or, taking the opposite view, still with the belief that dentistry is a specialty of medicine, and reversing the order of study by first pursuing the dental curriculum and finishing with the medical course, as has been frequently done, can the best practitioner of dentistry be so produced? When this has occurred, has not the tendency in men so educated been to abandon dentistry for the practice of medicine, and have they then made the best practitioners of medicine? Judging either of the methods outlined by the character of its product, both would seem to be defective, and the end intended to be reached by a

solution of the question on which they are based, viz.,—"Is dentistry a specialty of medicine?"—has not been reached. The problem is more fundamental, and a different framing of the query may yield more fruitful results. The difficulty is not one which relates to the distinctly separate features which characterize medicine and dentistry individually, but rests solely upon the question of which shall occupy the middle ground, which they have in common as between them, the *terra incognita* where they come in contact, where often medical and dental practice overlap, and which neither has definitely pre-empted or occupied as its especial field.

The intelligent understanding of pathological dentition requires a wider study than is afforded by the purely dental curriculum; it requires as broad, if not a broader study than the medical curriculum affords. The general and special relations of histology and pathology are in the same chaotic condition as between dentistry and medicine; in fact, there is no portion of this middle ground which is the definitely acknowledged field of either class of practitioners.

A recently published new edition of a work on therapeutics, which is a recognized and standard authority, contains an article upon dental therapeutics written by a practitioner who several years ago passed through dentistry into medical practice. The statements therein made and procedures advocated would in the light of the present state of dental knowledge be a discredit to a second-course student in a reputable dental college. The same character of criticism is abundantly applicable to numerous dental practitioners, whose writings upon medical topics too often bear evidence of their lack of thorough medical training.

The need for closing this well-recognized hiatus between dentistry and medicine requires no argument to sustain it. The closing of it will forever dispose of the question so much discussed respecting the relation of dentistry to medicine. The problem of how it is to be done is the vital question which should be discussed at the Columbian Dental Congress, and if not settled it should at least be disposed of in a manner which will lead ultimately to its settlement by defining the attitude of the dental educational forces in this country with respect to it, so that we may know whether the education of dentists shall be intrusted to dental teachers as heretofore, whether the dental curriculum shall be so arranged and enlarged as to include the middle ground between dentistry and medicine, or whether we are to leave it open in the hope that our medical brethren will occupy it, which they have as yet shown neither desire nor willingness to do.

When these questions shall have been disposed of, there will be no difficulty in defining the professional status of the dental practitioner.

THE PALATAL RUGÆ IN MAN.

THE literature respecting the palatal rugæ in man is extremely meager. The most important contributions to the subject, probably, have been made by Professor Harrison Allen. Investigations so far have usually been made from the anatomical standpoint, and are descriptive in character, relating principally to number, form, structure, position, etc. Ichigoro Nakahara, a native of Japan, calls attention in this issue to one physiological phase of these formations of the palate. It would seem to be a fit subject for careful research, to determine to what extent the rugæ in man are factors in mastication, insalivation, articulate speech, etc., and so settle, if possible, their physiological significance.

LOCAL ANESTHETIC NOSTRUMS.

WE are in receipt of a communication from the Arophone Mfg. Co., which contains the following statements relative to their preparation. The letter also contains an expression of their views with respect to the dangerous qualities of nitrous oxid, with a somewhat sensational account of a fatality which they state recently occurred in Buffalo, N. Y., under nitrous-oxid anesthesia. As this portion of their communication is not germane to the question of local anesthetic nostrums, we omit it here. The remainder of the letter we print in full :

TO THE EDITOR OF THE DENTAL COSMOS :

Dear Doctor,—In the May number of the Cosmos, beginning on page 354, an article entitled "The Question of Local Anesthetic Nostrums" has created considerable sensation throughout the country among those of our patrons who have been using our local anesthetic, Arophone. This article does us an injustice from the simple fact that it is not true as far as the analysis given is concerned, and it is also misleading from the fact that the chemist who claims to have analyzed this preparation, Arophone, says he cannot find any aristol therein.

Since the greatest feature contained in this article deals wholly and solely upon the word "Cocain," we will state here and now that we are perfectly willing that the analysis of our preparation should be published to the world ; but as the article does not call for this, and deals only with the cocain problem, we will solve that herein by stating that Arophone does contain a small per cent. of cocain, but the quantity is less than one per cent., and no one has ever been able to produce a case of evil resulting from this preparation throughout the entire world, that we have yet heard of.

Again, it is stated that chloral and oil of rose and several other drugs enter into the composition of this preparation, Arophone, which positively do not. We are willing to send you for analysis a two-ounce trial bottle of this preparation free of charge, if you will give it a fair and honest trial and publish the results to the world. Aristol enters into every drop of the preparation that is made by us, and we have no record that shows that Dr. Kirk has

ever ordered a bottle of this preparation from us or from any agent we have ever had that we can hear of, as none of them are authorized to sell it to any one: the preparation is always furnished direct from our house, therefore we think it quite likely that Dr. Kirk has received a package of some preparation purported to be Arophone and which was not. There has never been a preparation produced that contained virtues which has not been counterfeited, therefore we think Dr. Kirk has caused an examination of something else to be made, and given us the credit of having claimed to have something we did not possess.

We wish you would be kind enough to correct this mistake in the June number of your journal, and give us what is considered justice. The facts of the case are that local anesthetics have come to stay, and we have never yet been able to ascertain from any chemist, or practitioner of dentistry or medicine, any case where one per cent. or less of cocain has been injurious to the health of the patient, either constitutional or otherwise.

In the argument of the article in mention, Dr. Kirk claims that it is not an arraignment on the use of cocain in dentistry, for he uses it extensively himself, going on to state that it is an arraignment on the illegitimate use of cocain, disguised under a fanciful name so it is not known to the operator. No one in the practice of dentistry or medicine who has ever used any of our preparation, and who has asked us the question, "Does it contain cocain?" has ever been refused the answer. It does contain a small per cent. of the same.

* * * * *

We are perfectly willing, believing that this preparation, Arophone, is perfectly safe and the best thing ever placed upon the market, to allow any one who is a careful and competent chemist to analyze the preparation and give it to the world, and we will forward to any such a sufficient sample to show them the proper analysis as before stated. We will say, however, that chloral or oil of rose do not enter into the composition of Arophone, as before stated, and but very little cocain, less than one per cent., therefore the analysis is entirely wrong and unjust.

Hoping that you will allow us sufficient space in the June number to correct this mistake, we remain,

CINCINNATI, O.

Most respectfully,

AROPHENE MFG. CO.

The points at issue are sufficiently clear. The article on "The Question of Local Anesthetic Nostrums" in our last issue had for its object the publication of the fact that these preparations contain cocain or some of its salts as the principal active ingredient, and that it is upon the cocain constituent that their efficacy as local anesthetics depends.

None of the analyses reported in the article gave the quantitative results of any of the ingredients excepting cocain salt; the other constituents were simply determined qualitatively. The letter of the Arophone Manufacturing Company corroborates the statement that their preparation does contain cocain, but differs with the chemist's results as to amount. The difference is but slight, and under the circumstances is allowable. The fact of the existence of cocain in this

preparation is all that it was intended to establish, and the argument used in the paper against such use of cocain in nostrums still stands, for reasons already given.

The only other point which requires notice is the implied charge that the sample analyzed was not a genuine sample of Arophene, in answer to which it may be said that the sample was obtained directly from the Arophene Manufacturing Company through a responsible third party, and came with a letter of instructions, the usual testimonials, etc., and was, or purported to be, over their own signature, a regular sample of their product. The package, correspondence, circulars, etc., are in the possession of the author of the paper in question.

Finally, the chemist who made the analysis of this and the several other preparations was selected because he is "careful and competent," and we have entire confidence in the accuracy of his results as published in the May COSMOS, for which reason we do not deem it to be necessary or advisable to reanalyze a sample of Arophene furnished by its manufacturer especially for that purpose.

INTERNATIONAL MEDICAL CONGRESS.

WE note the following, which appears in the *Philadelphia Times and Register* of May 20 :

"The International Medical Congress, of Rome, has been indefinitely postponed, on account of the spread of cholera."

BIBLIOGRAPHICAL.

ORTHODONTIA ; OR, MALPOSITION OF THE HUMAN TEETH, ITS PREVENTION AND REMEDY. By S. H. GUILFORD, A.M., D.D.S., Ph.D., Professor of Operative and Prosthetic Dentistry in the Philadelphia Dental College ; author of "Nitrous Oxide," etc. Approved by the National Association of Dental Faculties as a text-book for use in the schools of its representation. Second edition, revised and enlarged. 8vo, cloth, pp. 228. Published by the author. Philadelphia, press of Spangler & Davis, 1893. Price, \$2.25.

The number of good, practical text-books upon dental subjects is greatly disproportionate to the need which exists for them. Not that there is any lack of books, but there is a lack of those which are a practical help and guide to the student, books which possess the two essential elements that make a text-book useful,—viz, a proper and

judicious selection of subject-matter, with a clear and intelligent method of presenting it. Professor Guilford's book on Orthodontia is a commendable example of the character of text-book most needed, and is one which admirably fulfills the requirements of the student in this especial department of dentistry. The first edition, which appeared about three years ago, was written by request of the National Association of Dental Faculties, and afterward adopted as a text-book in the schools of its representation, having been examined by, and received the criticism of, all of the teachers of orthodontia in the schools of that body. This at once gave the work a definite position of high character.

The present edition has been greatly enlarged: some forty-two pages have been added, as well as fifty-two new illustrations in addition to two full-page plates. Twenty-seven of the old illustrations have been dispensed with to give place to those representing more valuable data. The whole text has been carefully revised, and much of it rewritten. Two new and important chapters have been added, one on "Electro-Plating" and one on the "Construction of Regulating Appliances." The whole work has been so carefully and systematically brought into harmony with the existing state of knowledge in this branch that the present edition may almost be said to be a new book on the subject.

It is essentially a text-book, for it deals with the fundamental principles upon which the subject rests, and proceeds from these to the consideration of typical illustrative cases in the clear, concise manner of the experienced teacher, which gives the book a positive value quite apart from the data which it contains. For its special object it appears to be beyond criticism. It not only meets the needs of the student and teacher, but will be a help and inspiration to the practitioner.

CLIFFORD'S MANUAL OF RECITATIONS IN MATERIA MEDICA, PHARMACY, AND THERAPEUTICS. Compiled for the Practitioner and Student. By E. L. CLIFFORD, D.D.S., formerly Professor of Dental Materia Medica and Therapeutics, Northwestern Dental School; Professor of General Materia Medica and Therapeutics, American College of Dental Surgery; Fellow of the Chicago Academy of Medicine, etc. 8vo, cloth, pp. 364. Chicago, The Kauffmann Medical Publishing Co., 1893. Price, \$3.00.

The character of this work is largely indicated by its title. The recitation system of teaching many of the more advanced subjects which constitute the elements of higher education has come to some extent into popular vogue recently. The advocates of the system make large claims for it, and contend that the essential features of a

subject so taught are more definitely impressed upon the student's mind by this method than by the exclusively didactic system of teaching. This claim seems to be well founded, though more time must necessarily be given to securing results before the absolute advantages of the method can be fully ascertained.

The recitation method as applied to the teaching of dental materia medica and therapeutics has been carried out in a conscientious, faithful, and painstaking manner by the author of the present volume, and while the matter presents a novel appearance in its new guise, the reader is struck with a certain suggestiveness of the method, which is impressive and interesting,—qualities, no doubt, which are in themselves sufficient to recommend it.

The book is replete with all necessary data within its range, and these alone make it valuable. The National Association of Dental Faculties has recommended its adoption as a text-book.

OBITUARY.

DR. AMBROSE LAWRENCE.

DIED, at Boston, Mass., April 23, 1893, of apoplexy, AMBROSE LAWRENCE, D.D.S., in the seventy-seventh year of his age.

Dr. Lawrence was born at Boscawen, N. H., May 2, 1816. He learned the trade of machinist at Peterboro, in that state, and subsequently went to Lowell, Mass., to take the position of overseer in the Suffolk mills. Remaining there but a short time, in 1837 he went to Georgia and studied dentistry with Dr. Smith, a relative of his wife. Returning north in 1839, he opened dental rooms in Lowell, where he practiced for many years. During his residence here he took an active part in politics, having at different periods been elected to the common council, twice to the board of aldermen, to the school board, and was chosen mayor of the city in 1855, as the candidate of the American party. He was also prominently connected with the Masons and Odd Fellows.

About twenty years ago Dr. Lawrence removed to Boston, where he gave most of his attention to the manufacture of Lawrence's Amalgam, so familiar to all dentists. He received a professional degree from Harvard College, and became lecturer in the Boston Dental College, in which he was at one time a professor. He was also a graduate of the Pennsylvania College of Dental Surgery, class of 1866, and belonged to several dental societies.

Dr. Lawrence was twice married, and leaves surviving him a widow and one son, Dr. George W. Lawrence, formerly a dentist of Lowell, Mass., but now of Chicago, Ill. His funeral took place at his late residence, in St. Botolph street, Boston, on April 26, and the remains were interred at Mt. Hope cemetery.

DR. J. SMITH DODGE.

DIED, at his home in Morristown, N. J., April 28, 1893, Dr. J. SMITH DODGE, aged eighty-seven years.

Dr. Dodge was born in Connecticut in 1806, removed to New York in his youth, and in 1827 began the practice of dentistry. He continued to see patients

until the last few years, making fully sixty years of continuous practice ; and in all this time there was but one considerable interruption from sickness. Since 1865 he had resided in Morristown, N. J. He died from the simple failure of nature, without disease.

Dr. Dodge may be said to have founded a large family of dentists, including relatives near and remote, and pupils. He was also one of the original founders of the New York College of Dentistry. His tastes were plain and simple and he was never much in society, but his influence was wide and he made many and lasting friends. Those who knew him will recall his practical common sense, his frank speech and hatred of shams, his genial humor and inexhaustible fund of anecdote ; while those who knew him well will long remember him as a steadfast friend and wise adviser, an upright citizen of unsullied reputation, a pure-hearted Christian who loved God and his fellow-men.

DR. E. COGGINS.

DIED, in Boston, Mass., March 19, 1893, of acute pneumonia, Dr. E. COGGINS, in the fifty-first year of his age.

Dr. Coggins was born at Charleston, Me., November 7, 1842. In 1865 he commenced the study of dentistry with Drs. Coburn & Freeze, at Lewiston. He entered practice at Boston, Mass., in 1868, with Dr. J. Thresher. He had been in successful and independent practice in Tremont street, Boston, for many years up to the time of his decease. He was married May 15, 1872, to Miss Susan H. Byard, of Boston.

DRS. E. N. HARRIS AND W. W. ALLPORT.

Resolved, That the American Academy of Dental Science learns with sorrow of the decease of Dr. E. N. Harris, an original member who has given his constant service to the academy since its formation, during twenty-five years ;

That his faithful, conscientious, and unremitting labors are deeply appreciated and will be long remembered by his associates in the society ;

That the above be placed on record and a copy be sent to his family.

Resolved, That by the decease of Dr. W. W. Allport, of Chicago, the American Academy of Dental Science loses from its list of honorary members one, who with unfailing integrity has represented during his long professional life, the highest qualities as a sound and progressive practitioner, during a most remarkable period in our profession ;

That we deem his removal a loss not only to ourselves, but to the whole profession in this country and all the civilized world ;

That this expression be recorded and a copy be sent to his family.

JACOB L. WILLIAMS,	} Committee.
THOS. FILLBROWN,	
R. R. ANDREWS,	

DENTAL LEGISLATION.

DENTAL LAW OF WYOMING.

FOLLOWING is the text of the law regulating the practice of dentistry in Wyoming, which was approved by the governor and went into effect February 18, 1893:

Be it enacted by the Legislature of the State of Wyoming:

SECTION 1. It shall be unlawful for any persons to practice dentistry or dental surgery in the State of Wyoming without first having received a diploma from a reputable dental college or university, duly incorporated or established under the laws of some one of the United States or some foreign government, which is recognized as such by the National Association of Dental Examiners. *Provided*, that nothing in Section 1 of this act shall apply to any *bona fide* practitioner of dentistry or dental surgery in this state at the time of the passage of this act; and *Provided*, that nothing in this act shall be so construed as to prevent physicians or surgeons from extracting teeth.

SEC. 2. Every person who shall hereafter engage in the practice of dentistry or dental surgery in this state shall file a copy of his or her diploma with the county clerk of the county in which he or she resides, which copy shall be sworn to by the party filing the same, and the clerk shall give a certificate with the seal of the county attached thereto, to such party filing the copy of his or her diploma, and shall file or register the name of the person, the date of the filing, and the nature of the instrument, in a book to be kept by him for that purpose.

SEC. 3. Every *bona fide* practitioner of dentistry or dental surgery residing in this state at the time of the passage of this act, and desiring to continue the same, shall, within sixty days after the passage of this act, file an affidavit of said facts as to the length of time he or she has practiced in this state, with the county clerk of the county in which he or she resides, and the said clerk shall register the name of and give a certificate to the party filing the affidavit, in like manner and of like effect as hereinbefore provided.

SEC. 4. All certificates issued under the provisions of this act shall be *prima facie* evidence of the right of the holder to practice under this act.

SEC. 5. Every person violating the provisions of this act shall, upon conviction thereof, be deemed guilty of a misdemeanor, and be punished by a fine of not less than fifty dollars, nor more than two hundred dollars, for each and every offense, or be imprisoned in the county jail for sixty days, or both fine and imprisonment, at the discretion of the court, and all fines collected shall belong to and be paid into the common-school funds of the county where the offense was committed.

SEC. 6. Any person who shall have filed his or her affidavit or diploma, as required in Sections 2 and 3 of this act, in one county, and remove to another county, shall, before entering upon the practice of his or her profession in such last-named county, procure a certified copy of the record of his or her former registry, and cause such transcript to be filed and recorded in the dental register of such county in which he or she has removed.

SEC. 7. This act shall take effect and be in force from and after its passage.

PERISCOPE.

THE DEMANDS FOR STERILIZATION.—The antisepticizing of water by the addition of chemical substances merits just a few explanatory statements for the correction of certain erroneous ideas which I believe to exist.

Bichlorid of mercury does not insure immediate death of everything in the way of germs, as ordinarily supposed. *Staphylococcus pyogenes* and *Bacillus pyocyaneus* live for a quarter of an hour in a one per cent. solution. Anthrax spores resist a one per cent. solution for twenty-four hours. Boric acid, ammonia, and absolute alcohol have little influence upon them. They sur-

vive a five per cent. carbolic solution for days. Tetanus, tubercle, and spores of other pathogenic bacilli present similar degrees of resistance.

Clear spring water, in which the individual bacilli are suspended isolated, may be disinfected, but the highly contaminated water of rivers and ponds, containing gross visible masses of impurity rich in bacteria, does not admit of being rendered sterile by the addition of antiseptics. Heat is the only absolute agent,—simple in its application, most rational and reliable. The spores of anthrax, the most resistant pathogenic spores known to us, are completely destroyed by boiling in water for three minutes. Five minutes of boiling them must remove every reasonable possibility of any germs remaining alive.

Miquel found that of one thousand bacteria in water, 95.5 per cent. were destroyed by short boiling. Water of the river Rhone, which contained thirty-three thousand bacteria to the litre as revealed by the investigations of Lortet, lost through boiling all but nine hundred and forty-one bacteria, or over ninety-seven per cent. Bacteria which resist boiling water are only such as possibly the hay bacillus,—i.e., non-pathogenic, and consequently unimportant.

The absolute certainty of heat sterilization and its readiness of application make it strongly desirable that every surgeon shall provide a sufficient quantity of sterilized water for use in his operating-room or clinic. And as there are bacteria that thrive and multiply in water, it is necessary that after boiling it be closed hermetically, or, preferably, boiled fresh each time it is needed.

Sterilizing in bottles is only adapted to limited use; for hospitals and clinics and general operative purposes a special apparatus is necessary.

The relation of cause to effect existing between the occasional occurrence of abscesses in association with hypodermic injections has been recognized since an early period in the use of the hypodermic syringe.

We have the one instance in which four consecutive tabes patients were inoculated with erysipelas, and three of them died. Two typhoid patients in a state of collapse developed rapidly fatal purulent œdema following injection of tincture of musk. Two cases of fatal phlegmon resulted from the subcutaneous administration of quinin (Leyden's clinic, Charité, Berlin).

The inoculation of anthrax in the injection of a solution of arsenic has been observed in the Breslau clinic of dermatology. Two cases of tuberculosis are lately recorded, one by König and the other by Eiselsberg.

There has been in general too little attention given to the liability of the presence of organisms in injected fluids. Schimmelbusch and Hohl have shown that the hypodermic solutions obtained from various apothecaries' shops in Berlin contain vast numbers of live bacteria. The germs present in a one per cent. pilocarpin hydrochlorid solution were innumerable. In an ordinary solution of ergotin there were ten thousand bacteria to the cubic centimeter. Solutions of atropin, morphin, and cocain hydrochlorid also were rich in organisms.

It is quite important that we should recognize that the pus-formers—the Fehleisen erysipelas streptococcus and other pathogenic organisms—multiply in the fluids which we are injecting into the body.

Ferrari has recently shown that in one per cent. solutions of morphin and atropin the organisms not only *live* for weeks, but indeed *increase* with marvelous rapidity and form pure cultures in the fluid.

In glycerin the *Staphylococcus pyogenes aureus* remains alive and active for six days, then gradually dies. In two per cent. morphin solutions it retains its vitality for twenty-four hours; in ten per cent. cocain solutions for two hours. Only in the stronger solutions—such as those of ether, musk, quinin bisulphate, fifty per cent. antipyrin, and twenty per cent. caffen benzoate—does it die at once. In 0.15 to 30 per cent. strychnin sulphate bacteria live for eight days. In one per cent. hydrochlorid of cocain, after nine days, thousands were still alive.

That the subject of bacterial contamination of hypodermic solutions and the consequent danger of subcutaneous medication merits some attention, therefore, must be conceded.

Not only should we sterilize prepared hypodermic solutions and use sterilized water in dissolving morphin and other tablets, but the syringe and needle also should be sterilized.

Five minutes' submersion in boiling water suffices to render the instrument aseptic. The fluid may be heated in a test-tube over the gas or lamp flame.

The mechanical cleansing which should constitute the preparatory part of every sterilizing procedure, for removal of the grosser contamination,—such as dried blood, pus, and masses of fat,—does not, of course, insure an absolute asepsis. The instruments will often still be found to contain many varied forms of micro-organisms strewn promiscuously over their surface.

For the removal of this final but important source of error the impracticability of the successful use of carbolic, boric, or salicylic-acid solutions, or even bichlorid of mercury, by pouring one of the latter over the instruments for a few minutes, is proved by the foregoing references and demonstrated facts.

The instruments must be sterilized, and the choice of method lies between hot air, steam, and boiling solutions. Only the latter of these shall I consider. Spores of many bacilli resist hot air at one hundred and forty degrees for two hours, and steam for forty minutes to an hour, while *boiling in soda insures absolute death of even anthrax spores in from three to five minutes.*—*Frank J. Thornbury, M.D., in New York Medical Journal.*

DEATHS UNDER ANESTHETICS.—Gurlt (*Rathgeber für Gesunde und Kranke*, November 19, 1892) reported to the last Surgical Congress at Berlin the following statistics of deaths under anesthetics. They are made up from the observations of sixty-two operators, who anesthetized 109,196 persons, with 39 fatal results, showing 1 death to 2800 narcoses.

The following were the anesthetics used :

Chloroform.....	94,123 narcoses,	36 deaths.
Ether.....	8,431 “	no deaths.
Ether and chloroform.....	2,891 “	1 death.
Ether and alcohol.....	1,381 “	no deaths.
Bromoform with ethyl bromid..	2,151 “	1 death.
Pental	219 “	1 death.

In 2913 cases the narcosis lasted over an hour; in an operation for utero-vaginal fistula, four and one-half hours; in a case of tetanus, nine hours.

In 25 cases of which post-mortem examinations were made, cardiac diseases were found. The author urges careful examination of the heart before administering chloroform.—*Condensed Extracts.*

IODIN TRICHLORID AS A LOCAL APPLICATION.—Belfield, of Chicago (*New York Medical Rec.*,) recommends a trial of iodine trichlorid (I Cl_3) in the treatment of tuberculous and suppurative processes. It is formed by passing chlorine gas over iodine; it is obtained in reddish crystals, is soluble in its own weight of water, and almost as readily in alcohol, and either solution can be mixed with glycerol without decomposition. When it comes into contact with mucin, pus, or any proteid matter, it is immediately decomposed, yielding iodine and chlorine gas. He believes it to be a powerful local antiseptic; he has used it in irrigating suppurating wounds in one to five per cent. solution in water, with or without the addition of glycerol. For offensive cancerous surfaces and venereal sores he has used five to twenty per cent. in equal parts of water, alcohol, and glycerol. Solutions stronger than five per cent. cause smarting in ordinary wounds. Gauze sterilized by boiling, immersed in one to ten per cent. aqueous solution and dried, retains iodine trichlorid for an indefinite time.—*British Med. Journ.*

CALCIUM FLUORID IN BONES.—The percentage of calcium fluorid in bones has been given heretofore, mainly on the authority of Heintz, as averaging 2.0. Carnot has recently analyzed a variety of fresh bones by distilling off the fluorine as silicon tetrafluorid, decomposing this gas with water, and weighing the silica which is thus produced according to the well-known reaction. He found that the calcium fluorid in bones varies from 0.20 per cent. to 0.63 per cent., the former value being for ivory, the latter for the bones of the dugong (sea cow). According to Gabriel, the current statement of the percentage of calcium fluorid in teeth is a still greater error. So far from

there being some two per cent. in the dentine and four or five per cent. in the enamel, Gabriel finds difficulty in recognizing any at all; moreover, his analyses add up to ninety-nine per cent. without troubling about any calcium fluorid.—*Druggists Circular*.

A NEW METHOD OF EXPOSING THE INFERIOR DIVISION OF THE FIFTH NERVE AT THE FORAMEN OVALE—Krönlein (*Arch. f. klin. Chir.*, xliii) proposes that an incision should be made from the angle of the mouth to the tip of the ear, without cutting through the buccinator muscle and mucous membrane of the cheek. The masseter muscle is separated from the parotid, which together with its duct is left undisturbed. The coronoid process is freed and divided obliquely with bone-forceps, and then lifted up with the temporal muscle. The fat is next cleared away from the cheek and the buccal nerve in its course between the internal and external pterygoid muscles, and the inferior dental and lingual nerves brought into view. In order to find the auriculo-temporal nerve the external pterygoid muscle is raised and the internal maxillary artery double ligatured and divided, when the auriculo-temporal nerve, with the middle meningeal artery between its branches, is seen; and the individual branches of the inferior division of the fifth nerve may be divided at the base of the skull or pulled out.—*British Medical Journal*.

TROPHIC TROUBLES OF THE NAILS, HAIR, AND TEETH IN CAGOTS.—The *Cagots* (Cretins) of the lower Pyrenees frequently exhibit affections of the nails, hair, and teeth. In fourteen families I have seen these alterations transmitted by heredity. The members of these families have congenitally hypertrophied nails analogous to the nails of old people, and alopecia relative or absolute; the hair, the eyebrows, and the eyelashes are rare or are completely wanting. These alterations are not transmitted to all the members of the same family, some among them remaining unaffected. I have also observed a family which presented particular troubles of dentition. The number of the teeth is less than normal, the two lateral incisors, superior and inferior, being especially wanting. The Cagots do not show these alterations except at the salteries and in some neighboring villages, where salt springs and deposits of salt exist. Everywhere else the Cretins are sound. Many authors have maintained that the Cagots are the descendants of lepers. The care with which they are avoided, to the extent that in the churches there is a special vessel of holy water for them, and their very name of *Cagots* confirms this opinion.

In Brittany, in fact, where there exists a mountainous people called Cagots, the word *kodod* signifies leprosy, and the leprous are designated under the name of *kakous*. Without pronouncing a definite opinion, I can say that there are yet in those parts some cases of leprosy, and I found at Andrein, in a Cagot, a case of Morvan's disease perfectly characteristic. Now we know that Zambaco regarded the Bretons affected with Morvan's disease as leprous.—*M. Lajard, in N. Y. Medical Abstract*.

DEGENERACY IN MAN.—Until Morel's epoch-making work on degeneracy in man appeared, studies were few and far between. With the acceptance of his views by German, American, Italian, and Scandinavian alienists, the literature on the subject rapidly accumulated. The earliest defects noticed in the degenerate by Morel were those of the jaws and teeth. This is hardly astonishing when it is remembered that few structures vary so widely. The beak jaw of the cuttle-fish disappears in the lancelet. It reappears in the bird, at first toothed, and in the oviparous mammals, toothless. The edentates, albeit higher than the marsupials, are lower as regards their jaws and teeth. The most striking variations occur in the whales. The Greenland whale is toothless when adult, whalebone supplying the place of teeth. The sperm whale is toothed. So variable a structure was naturally first affected by degeneracy. It is not surprising, therefore, that Morel's observations should be corroborated not only by alienists like Meynert, Spitzka, Clouston, Krafft-Ebing, Magnan, and Lombroso, but by dentists like Iszlai and Talbot, who approached the subject purely from a dental standpoint. Dr. Talbot (who has made to the Chicago Academy of Medicine, in conjunction with Dr. Lydston, what the *Journal of Mental Science* styles the most important

American contribution to criminal anthropology) has been severely criticised by Dr. Garrett Newkirk (*DENTAL COSMOS*, 1892). This criticism is based on evident ignorance of current literature on degeneracy and neuropathology. The claim that neurotic causes can produce both deficient and massive jaws is ridiculed, in complacent disdain of the fact that neurotic causes produce both microcephalic and macrocephalic idiocy, and of the existence of neuropathic atrophies and hypertrophies. From such a standpoint criticism was inevitable, but it can hardly be considered scientifically valuable.—*Medical Standard*.

THE TREATMENT OF OBSTINATE SUPPURATIONS OF THE MAXILLARY SINUS.—Dr. Cartez deals with this subject in the September issue of the *Archives Internationales de Laryngologie*, etc., touching first upon the diagnostic signs, and stating his doubt of any sure means of early recognizing the cases difficult or impossible of cure by mere irrigations. He accords high value to the electric lighting from the mouth (as does Davidson, in the *Berlin. Klin. Woch.*, July, 1892, pp. 665 and 697, who insists especially upon the penetration of the illumination to the eye as the real evidence of freedom of the antrum), and believes it is pathognomonic if properly employed. He cites the two cases which he has met which had proved rebellious to irrigations, without noting how much experience of the other kind he had had and the proportion which these two represent. In each, former treatment by himself or others had given amelioration only; so he opened the sinus freely from the alveolar border, studied the interior by means of an inserted electric light, and dealt surgically with the morbid conditions within by dividing septal bands, removing and curetting away diseased lining membrane when "pyogenic" in character, all outgrowths. In each case early cure was obtained, which has now persisted a year or more in evidence of its permanence.—*Therapeutic Gazette*.

LYSOL.—Cadea and Guinard (*Providence Med.*) have made a series of experiments on lysol from which they draw the following conclusions: Lysol is superior as a microbicide to carbolic acid, creolin, cresyl, and other analogous products; it has not, however, any advantages over the antiseptics of established reputation. It is only really efficacious when used in solutions, which may be caustic and irritating. Although not destined to play a great part in surgery, it may often be useful in the prophylaxis and arrest of epidemics and epizootics. It is likely to be particularly serviceable in the disinfection of premises, privies, railway carriages, ships, wharves, stables, and cow-houses. It is readily soluble, sufficiently active, and very cheap.—*St. Louis Medical Journal*.

HINTS, QUERIES, AND COMMENTS.

DEATH FROM NITROUS OXID.—The *Chemist and Druggist*, March 25, 1893, reports the death of Thomas S. Minett, a dentist of Chelsea, Eng., who was found dead by his servant under the following circumstances. About five o'clock a gentleman called at Minett's office, and as there was no response to the knock of the servant, she entered the deceased's room and "found him sitting in the chair with his mouth covered with the gas machine." He was dead. The physician who was called said he found life extinct. The body was warm, and the ears and lips were livid and the finger-nails were blue, which were the symptoms one would find from the inhalation of nitrous-oxid gas. He examined the apparatus and found no gas in the bottle. The valve was closed, so that the deceased must have been inhaling the gas without air. There were no signs of a struggle in the room. The jury returned a verdict "That the deceased died from asphyxia, from inhalation of nitrous-oxid gas, and that such death was due to misadventure."

HYDROGEN DIOXID.—An editorial by Dr. John Aulde in the *American Therapist*, Feb., 1893, says, "Hydrogen dioxid is relatively but not absolutely harmless. . . . Like mercury, it will cause the teeth to become loose, and that the writer has witnessed in the case of a patient who deemed himself capable of self-medication ; but a freshly prepared product, free from an excess of acid and other impurities, properly used, is absolutely harmless."

This statement is inaccurate and somewhat misleading. The writer acknowledges that pure H_2O_2 is absolutely harmless ; this is in accordance with the general experience of dental practitioners with its use in the oral cavity. If loosening of the teeth has followed its use, such action should be charged to the impurities which so frequently contaminate commercial preparations of H_2O_2 . The analyses made by Leffmann show that very many of the H_2O_2 solutions on the market contain variable amounts of free acid. That the use of such a preparation might cause a loosening of the teeth is not impossible nor unlikely, and its effect upon the enamel would be obvious ; therefore all commercial solutions of H_2O_2 should be carefully neutralized with sodium carbonate or bicarbonate before being used in the mouth ; or where H_2O_2 is used as a dentifrice, it should always be in connection with precipitated chalk, under which conditions it is perfectly neutralized, and affords one of the best, if not the very best, antiseptic dentifrices obtainable, and one altogether harmless.—**ED. DENTAL COSMOS.**

REPREHENSIBLE PLATE-WORK.—Mrs. P., aged twenty-eight years, a native of England, came to my office on December 10 last. She stated that some ten years ago she applied to an English dentist for an upper denture, and, after arranging the preliminaries, he took a pair of excising forceps and nipped off the crowns of all her upper teeth, with the exception of the left central incisor, leaving the roots of the teeth *in situ*, and without any treatment whatever proceeded to take an impression, from which he constructed



the silver plate shown in the illustration. The hook shown on the front of the plate embraced the neck of the incisor left standing. A feeble attempt at modern crown-work is shown by the small post soldered to the upper side of the plate, and which entered the root-canal of the right superior first bicuspid. This post, shown by the dotted lines in the figure and separately at B, had long since ceased to be of any value in assisting to retain the plate in position, on

account of the caliber of the canal being enlarged to twice its original size, both by caries and the friction of the post. The plate was prevented from dropping out of the mouth by the hook over the central, the neck of which was greatly abraded, as shown at A, A. On her arrival in America some three years ago, she had the hook tightened by a dentist, since which time she has been unable to get the plate out of her mouth, the posterior portion hanging pendulous from the incisor. On removing the plate a most disgusting state of things presented itself. A large number of the roots were abscessed, and the surrounding gum was sodden with pus. The plate was incrustated deeply with food *débris* and other filth. She stated that her health had been poor for a number of years, attributable, doubtless, to the conditions described. If a junior in any dental college of the present day should be guilty of so flagrant a violation of physiological laws, he would be set down as a numskull.—JAMES M. GROSS, M.D., D.D.S., Kansas City, Mo.

NITRATE OF SILVER AS AN APPLICATION TO DENUDED DENTINE.—The question of priority in the introduction of this agent to the notice of the dental profession as an application to denuded dentine, as well as the length of time in which it has been so employed, was pointedly discussed during the last meeting of the American Dental Association, at Niagara Falls. Dr. Kasson C. Gibson has called our attention to the article by Dr. B. T. Whitney, of Buffalo, upon nitrate of silver, published in the *Dental Register of the West* for April, 1854, page 204. The following extracts from Dr. Whitney's paper indicate that its use as an application to denuded dentine was not altogether new in his time, and also that the *rationale* of its action was clearly understood even then :

"There has long been, and is still, to a very great extent, a popular prejudice in the profession against the use of the nitrate of silver as a topical application to the teeth or mouth.

"This arises, in part, from the known proportion of nitric acid used in its composition, or rather in its preparation, and the effect of acid upon the lime of the teeth, and, in part, from the coloring matter, supposing the disorganization of the tooth-body must necessarily follow. . . .

"The destructive effects of pure nitrate of silver upon animal tissue has brought it into use with the surgeon ; but still, in a very weak solution, it preserves animal matter, and even prevents polished steel from tarnishing.

"As an application to decayed or denuded teeth, that have become sensitive, I hold it in high estimation. It acts decidedly, and in a two-fold way—in destroying the animal fibers that, in their ramification through the body of the tooth, become exposed and inflamed—and then, by closing the mouth of the cells with the silver, which, in parting with its corrosive power, unites with oxygen, and forms an inert metallic oxyde. This gives a coating of insoluble metallic body over the denuded part of the tooth ; though exceedingly thin, yet sufficient to protect the nervous filament and dentine from irritation and contact with the 'outer world.' The tooth-body being porous, absorbs more or less of the nitrate, which soon oxydizes, and gives the tooth a blackened appearance. These canals, though sufficient to transmit nutriment from the nerve-pulp, through the dentine, are too minute to allow the introduction of the particles of nitrate of silver to a very great depth, so that the discoloration is superficial.

"That the oxyde of silver closes the cells, and forms a metallic surface, is per-

fectly demonstrable, by immersing a tooth, with the dentine exposed, in a solution of the nitrate, and then place it under the blow-pipe, with a heat sufficient to fuse the silver, when a bright silver surface will appear to the naked eye, susceptible of bearing a polish with a burnisher, almost equal to that deposited by the electro-galvanic battery upon a metal surface.

"Teeth to which artificial substitutes are attached by clasps, usually suffer, either from decay or wearing away, and, sooner or later, become very tender to the touch, or sensitive to changes of temperature. Nitrate of silver acts like a charm in allaying the tenderness, though it gives a black coating to the surface.

"When used on these teeth, the plate should be left out for a few minutes, until the silver is oxydized, otherwise the clasp will also become discolored. In denudation of the teeth—that is often very troublesome—or in ordinary decay, it may be used freely without fear of injury.

"The pure chrystals are much better than the common sticks. In the softening of a tooth under a clasp, I have obtained decided benefit from its free use, in preventing the destruction of the lime, and forming over the surface a hard and impervious coating, the semi-disorganized portion of the tooth absorbing a greater quantity of the silver, which, in oxydizing, becomes very hard.

"Its effects, in most cases, in allaying tenderness of the dentine, is, of course, but temporary, as the coating of the oxyde is very light, and soon wears off, exposing the more highly organized part of the tooth to irritation.

"Of repeated applications will usually prevent pain, and, in most cases, if not arrest, at least greatly retard the injury to teeth from clasps or denudation."

ACUTE CEREBRO-SPINAL MENINGITIS AS THE RESULT OF NITROUS-OXID ADMINISTRATION.—Miss M. W., thirty-two years of age, lymphatico-nervousanguine temperament, required extraction of upper second bicuspidati. Four ounces from a fresh cylinder of gas were inhaled by means of improved Josti inhaler with inflatable hood; no marked stage of excitement; increase in respiration was noted early in the administration, earlier than usual; no marked flushing of the face; teeth extracted; consciousness recovered in usual time. In about three minutes there was complaint of exhaustion, followed by increased but shortened respiration, with quickened cardiac action, quickly followed by spasmodic action of the masseter muscles, causing rapid striking together of the teeth, with convulsive movement of the arms and fingers. There was marked flushing of the sides of the neck, with heat in the back of same; extremities cold; quickened and shortened respirations; rapid heart; whites of eyes showing; unconsciousness.

All clothing impeding respiration was removed, the lower limbs and feet bared, and friction applied, as also to the hands and wrists. The patient was kept in an upright position, wet cloths (cold) were applied to the neck (back and sides of same), and chopped ice, when procured, in place of the cold cloths. One drop of the dental tincture of aconite was administered by the stomach, with chloroform to the nose as the convulsive movements increased. The feet were put into hot water, and hot cloths applied at the base of the spine; friction was continued for three-quarters of an hour, when the movements ceased and consciousness was restored. Half an hour later the patient was allowed to depart.

The lady had undergone an operation three months previously for abscess of the liver, but her physical condition was good at the time of administration of the gas. The heart and lungs were sound, she had never had any trouble with the brain or spinal cord; the kidneys were sound. There was irregularity in the monthly discharge. At the most marked cardiac action, the pulse registered 145, and was normal when the patient was discharged. The administrator, operator, and two assistants were present.—W. B. SHERMAN, D.D.S., San Francisco, Cal.

THE TREATMENT OF PULPLESS TEETH.—Reading over many papers that have been written about the "best" methods of disinfecting and filling the canals of pulpless teeth, I notice that they all overlook the most reliable and only way of preparing the tooth before proceeding with any of the methods now in vogue. To disinfect the roots of any tooth, my mode of procedure is first to remove as much of the pulp as possible, and then induce a *complete* desiccation of the canals by means of hot air. This is no easy matter, but it can be accomplished successfully by means of a foot-blower attached to the hot-air syringe, and a little patience. An hour's continuous blowing of hot air into canals is sufficient. This I generally accomplish in two sittings, allowing the patient about twenty minutes' rest between, and sealing in the cavity meanwhile, with gutta-percha, a piece of cotton slightly moistened with absolute alcohol. I follow this with applications of hydronaphthol dissolved in glycerol, and more hot air, in order to *soak* the desiccated dentine with this antiseptic. The canals I pack with cotton saturated with this same substance, and seal with cement. I have had after-trouble in only two cases, within three years, and these were with abscessed teeth that would not take kindly to any treatment, and had to be extracted finally. The advantage of this method is great saving of time and annoyance to patients by repeated appointments, the operation being completed in the same day that it is undertaken. It seems to make no practical difference if only part of the pulp is removed and the canals imperfectly filled. This fact is no doubt due to the replacement of the fluids contained in the dentine previous to desiccation by the antiseptic used.—FRANCIS ESCHAUZIER, San Luis Potosi, Mexico.

SOLDERING WITHOUT INVESTMENT.—I observe in the article by Dr. Essig, in the April number of the DENTAL COSMOS, that he speaks of investing bands for the purpose of soldering thereon hooks and short tubes. With me there is a much easier and simpler plan. I join all bands in the making with high-grade solder—twenty or twenty-two carat. To attach a hook or tube to a band, first hold the latter with a pair of moderately thick pliers at the point of union. That this may be kept below melting point and from danger of unjointing, place a little flux and eighteen-carat (or lower) solder on the spot where attachment is to be made, and melt with a fine flame of the blow-pipe. If a bit of tubing is to be placed, take a piece of wire six or eight inches long, or any slender instrument the point of which will fit within, having this covered with a thin coating of a thin mixture of whiting (or rouge) with water, to prevent a flow of solder inside the tube, or possible sticking to the wire or point which we are to use as a holder in making the attachment. Now, with a reasonably steady hand, holding the band as before with pliers, the tube, fluxed on the joint side, may be quickly and accurately fastened to the band over a small gas flame; a piece of wire may be attached in the same manner,

leaving it long enough to serve for its own handle, and cutting off to proper length after soldering, or the hook may be held with jeweler's fine pliers.

Another method, and a good one, is to punch a hole in the band just large enough for the close insertion of the end of the wire, which should be fluxed, when it may be securely fastened with a bit of solder. This is an excellent way to attach screws of the "Angle" jackscrew sort.

Speaking of this reminds me that the so-called "pipes" of the "Angle set" are identical with those kept in stock by the wholesale jewelers under the name of "joint wire," in three or more sizes, and sold at about a cent an inch, German silver. The large size is available for jackscrew and traction purposes, with No. 18 gauge wire screws; the smaller for use in connection with spring wire for rotating teeth in *mal-tort**. This "joint wire" is also available for tubular posts in crown-work,—being very strong, and made with absolute accuracy.—GARRETT NEWKIRK, Chicago, Ill.

BAND-AMALGAM CROWNS.—If Dr. Van Vleck, whose article on the above crowns appears in the April DENTAL COSMOS, will extend the use of them to all teeth needing crowns back of the first bicuspid, he will be as well pleased with the results as he was in the case cited.

The first bicuspid, and in some cases the second superior bicuspid, should have porcelain faced crowns. In all other posterior teeth I have been using the band-amalgam crown for ten years, and have yet to know of one coming off. There can be but two objections urged against them that I know of. The first is common to all collar crowns,—*i.e.*, the danger of setting up chronic inflammation and recession of the gum and process; the other is, that the worshipers of the "golden calf" may not think they are pretty. They may not be artistic, but they are accurate and durable; properly made, they are less irritating to the soft parts than any other band crown, because there is nothing there but a close-fitting, smooth edge of gold, not platinum; no cement or any other rough and porous material; the articulation can be made *perfect*; and there is practically no possibility of their coming off.

Procedure.—Reduce crown to within about a line of gum-margin; the sides to parallels as low as the free margin of the gum will permit. Measure accurately, by burnishing a strip of thin sheet-tin around the stump. Measure the distance from the point where you wish the band to stop under the gum to points of cusps of antagonizing teeth with the mouth closed, with a pair of caliper-tweezers (see page 113, Evans's "Crown and Bridge-Work," second edition) for length of band when soldered. Mark the distance between the points of caliper-tweezers, and also the *length* of the measure, on twenty-two carat gold plate. Cut the ends of the gold strip slanting, so that the top may be larger and the bottom smaller than the stump measurement when the band is soldered, that it may have a better shape and drive on tight. Shape the small end to correspond with festoons of gum, bevel and polish. Now bevel the stump freely from near the gum-line, all around; spring the band over the end of the stump and drive to place, turn the edges, buccal and lingual, in, with How's curved pliers, supporting the opposite side with fingers; see that it does not interfere with occlusion anywhere; if it should interfere, grind off till free, supporting the band to prevent displacement; dry out and fill with

* "*Mal-tort*."—I have suggested this term to see how it will strike; *e.g.*, "*tort*," or "*mal tort*" to describe teeth with a twist. Example: "The lateral incisor had a pronounced mesio-labial *tort*."

amalgam from the bottom of the pulp-chamber to a little beyond the line of occlusion, packing the amalgam thoroughly with a thin instrument between the beveled edges of the stump and the band. Next day shape up grinding-surface with disks and burs, and polish, burnishing the band-edge carefully under the gum.

Advantages.—The band goes on water-tight, and so produces the minimum of irritation; there is never any wearing through; the articulation is perfect; there is no coming off or loosening; it is accurate; you can see every step as you go along. None of which can be said of shell-crowns.—J. W. FOREMAN, Asheville, N. C.

THE PALATAL RUGÆ IN MAN.—Remarkable progress has been made in dentistry of late years, and scarcely anything remains unexplained and untreated. But there is no dentist who has yet treated of the projections of the hard portion of the roof of the mouth, and therefore I do not hesitate to publish what I have investigated, notwithstanding my limited knowledge. These projections seem to be of no use, but they are. The Creator has given them to every human being for two reasons: first, to enable saliva to blend with starchy food; second, to facilitate the organ of speech.

Starchy food is indigestible without the help of ptyalin, and as the ptyalin is not produced in the stomach, all starchy food must be well blended with saliva in the mouth.

The blending of food and saliva is due to the actions of the tongue, teeth, cheeks, lips, and roof of the mouth, but above all to the action of the tongue helped by the roof of the mouth. Thus, if there is no roof to the mouth, the tongue cannot perform its actions; even if the roof be imperfect, it follows that the blending of food with saliva is also imperfect. Now supposing the roof to be smooth, it will naturally follow that the food taken in the mouth will become a soft mass; but if it be rough with projections, the tongue will press the food to the surface of the roof, and the food will be torn to pieces, thus causing saliva to blend with it, and the ptyalin to commence a chemical process on the starch. In other words, the roof of the mouth gives facility to the blending of saliva with food in its rough rather than in its smooth state.

Again, that the Creator has provided such a number of projections to the roof of the mouth to give facility to the organ of speech is evident, for if it be smooth, the tongue will stick and slip by every motion. For example, those who have artificial teeth, and especially those who have them in the upper jaws, with a gum or celluloid basis, speak as if short-tongued or as infants do, and are imperfect in articulation. This is owing to the dentist having polished the roof of the plate smoothly.

The above theory may not yet be well known by Europeans or Americans, but the Japanese have long investigated the subject and practically proved the truth of it.

The manner of producing the projections on the surface of the roof of the mouth, when dealing with an artificial basis, is as follows:

First take off the wax from the flaked case, then draw lines on the part of the investment which is to be at the lingual aspect of the roof of the mouth when the cover and the receiver of the flask fit together, and engrave the lines with a suitable knife, then fill in the rubber and vulcanize. Thus we can get the projections as we desire.—ICHIGORO NAKAHARA, Dentist, Japan.

TIRED HEELS.—As the success of a dental operation depends to a vast degree upon the patience of the operator, and as this patience depends largely upon the condition of the operator's physical comfort, and as the point of greatest physical discomfort to the operating dentist is his heel, therefore a few remarks upon the prevention and alleviation of tired heels may be of use to dentistry and afflicted dentists.

It was not until after the writer had been in the practice of our profession several years that, in seeking for some relief from this affliction, he tried the simple remedy of a change of shoes during protracted operations. The remedy was simple, but surprisingly effective. I say "surprisingly," because the relief obtained was so much greater than had been expected that the experimenter was at a loss to account for it. Often it took away all desire to rest the foot by sitting down, and made a walk of a mile or two quite agreeable. On mentioning the matter to a shoemaker, the writer obtained the explanation of this unexpected amount of relief. It is, that the soles of no two pairs of shoes are exactly alike; that while the bottoms of our feet shape to some degree every shoe-sole they bear upon, yet other factors in the shoe itself operate to interfere with this shaping, and cause certain parts of the shoe's sole to become more or less prominent, so that the bottom of the foot, which of course rests most heavily upon the more prominent parts of the shoe's sole and heel, becomes tired at these parts, and by its being removed into a shoe whose sole is shaped somewhat differently, it obtains relief because of the pressure being made to now fall on those parts of its ball and heel which have not been previously over-pressed.

Now for another consideration. The writer found by experience that he obtained relief after long operations by standing on the balls of his feet, thereby raising the heels off the ground. This made it evident that the heels suffer more during dental operations than the balls of the feet. Of course, the remedy for this is very simple: wear high-heeled shoes, and thus equally distribute the pressure on both ball and heel.

But the most important consideration is that now to be mentioned. While the relief obtained by changing shoes was great, it was not equally permanent, and the equalization of pressure on heel and sole gives only partial success. Indeed, it is doubtful if anything will give complete surcease from sorrow at this point. However, the writer found great help from the simple operation of placing inside the shoe, and below the wearer's heel, a cushion formed of soft and thin leather made into a pocket and stuffed with hair. The natural springiness of hair prevents this pad from ever flattening down very hard, and thus avoids the occlusion of the ball of the heel with those prominences of the leather to which we have before referred.

By means of these three plans, used either combined or separately, the irritating discomfort of tired heels can be largely banished for the dental profession.—STEWART J. SPENCE, Tazewell, Tenn.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I should like to make some additions to my remarks on page 190 of the March issue of the DENTAL COSMOS, in regard to dental notation. I dealt there with the surfaces of individual teeth, and think it would be proper to confine the Roman figures I to VI to the designation of the surfaces of natural teeth, whereas for the indication of the surfaces of artificial teeth a Roman X should be added to the respective figure. The various surfaces of the human teeth would then be discernible in the following manner:

	In natural teeth.	In artificial teeth.
Mesial side	side I	side XI
Distal side	" II	" XII
Labial or buccal side	" III	" XIII
Lingual or palatal side	" IV	" XIV
Neck	" V	" XV
Morsal surface	" VI	" XVI
Root	" VII	" XVII

As is commonly known, one of the proposals in the International Congress at Paris (see Dr. How's paper on pages 893-901 of the *DENTAL COSMOS* of November, 1890) was "to distinguish the temporary tooth from its permanent successor by prefixing a decimal point to the numeral." It is apparent that this latter system (which I consider as the most practical one ever devised) can just as easily be united with Dr. Palmer's notation, which consists of eight Arabic figures for the eight series of individual teeth in the adult, and five Arabic figures for the five series in the deciduous set, as it can be combined with the method of seven Roman figures for the seven surfaces of natural or artificial teeth.

To indicate the character of prosthetic work, I should think this could be done in the simplest way by some reinforcement on the angle-mark which serves as a positional index. Thus, for instance, a crown could be indicated by one reinforcement of the mesial line; a bridge-tooth, by two; a cap, by one reinforcement of the occluding line; and a plate, by one reinforcement of the occluding and of the mesial line.

The difference in prosthetic work could in this way be made apparent very easily; for instance, for a right upper lateral incisor in an adult person the dental notation would be 2; crown, 2; bridge tooth, 2; cap, 2; plate-tooth, 2.

This method has the advantage that it can likewise be combined with every one of the above methods, and also with all of them together, and I hardly believe that there is anything difficult to remember or hard to be learned in it; on the contrary, it is so natural that the whole system suggests itself, and even those who had never heard of it would, I think, be able to guess the meaning of these symbols, which really have no mysterious features.—HANS BLOCK.

THE *Engineering and Mining Journal* for April 15, 1893, publishes the following formula for aluminum solder:

Tin, 80 parts;
Zinc, 20 parts.

To be used with a flux composed of—

Stearic acid, 80 parts;
Zinc chlorid, 10 parts;
Tin chlorid, 10 parts.

A CONTRIBUTION TO ORAL HYGIENE.—The habit of touching the tip of the finger to the moistened lip in order to facilitate the counting of paper money caused the death of a man last January in Vienna. A commercial clerk, twenty-eight years of age, felt a stinging pain in his lower lip after having just counted a large number of bills. He did not pay much attention to the affair until a tumor had formed on his lip. Upon his wife's solicitation, the patient was brought to Professor Weinlechner, a surgeon of high repute,

who operated upon the tumor merely for relief of pain, for it was evident that all efforts directed toward a cure would be futile. Three days later the man died.

There are great numbers of people who by their business requirements are compelled to count large quantities of paper money, and many of them may and do follow the same thoughtless practice of moistening the fingers by the lips.

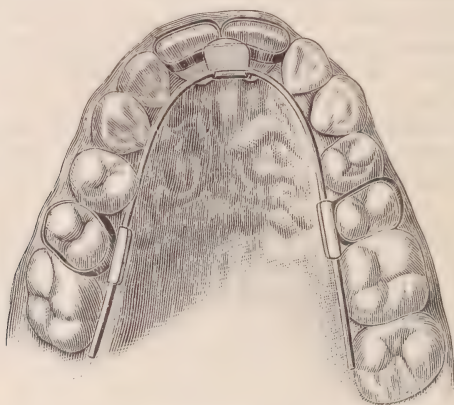
This source of danger should be noted in the teaching of oral hygiene, and as soon as this science is, as it ought to be, taught in the public schools, a great source of danger to health will be avoided.

The London schools, as is well known, are now provided with dental surgeons for the care of the children's teeth. It is perhaps more important that the prevention of oral diseases should be secured as far as possible by effective lessons upon oral hygiene.—HANS BLOCK.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I send you a model illustrating an appliance for regulating, which I have found very effective, and which I submit with the following description for the benefit of those interested in this class of cases.

The appliance, as will be seen in the illustration, is constructed as follows:



A band is fitted to each of the central incisors and the two second bicuspid or first molars; the central bands are soldered together, at the same time attaching a small strip of plate, which upon being bent upward, forms a support for the center of the curved wire. Upon the palatal surfaces of the posterior bands is soldered a section of split tubing, which forms a trough against which the extremities of the wire rest. When the appliance is thus far completed it is placed upon the model, and a piece of piano-wire of sufficient length is bent to conform to the inner surface of the arch (assuming somewhat of a U shape.) This wire, as will be noticed, is not attached to the other parts, hence admits of easy removal, either for cleansing, readjusting, or to substitute a larger or smaller wire, to produce greater or less pressure as the case demands.

A slight modification of this appliance may be made to include another class of irregularities,—viz, protruding centrals.

In such cases the first bicuspid, or possibly the cuspid, should be banded,

instead of second bicuspid or first molars; then, proceeding as before, both retraction of centrals and expansion of arch can be accomplished simultaneously.

Should a tooth be inside the arch, by shaping the wire to strike this tooth it may be forced into proper position. A tooth outside the arch may also be brought back by attaching it by ligature to the wire.

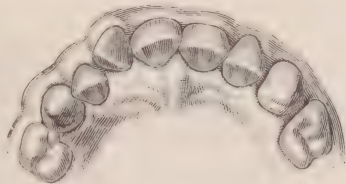
Thus, while teeth may be brought into proper position in the arch, the process of expansion may proceed at the same time, if desired. This process is applicable with equal facility and effectiveness to either the upper or lower teeth.

The simplicity of this appliance is not its only recommendation, as I feel sure that a trial will prove it to be of value for the purposes designed.—H. LINDBERGER, Bowling Green, Mo.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I herewith send you model of (to me) an interesting case, taken from a child two and a half years of age; Irish parents, American born, living in affluence.

At the age of twenty months, all the deciduous teeth were fully erupted, and standing in regular line. At twenty-four months, this supernumerary or permanent lateral made its appearance between the right central and lateral, and forced itself into the position represented in this model. From its size, color, and general appearance, I was led to believe it to be a *permanent* tooth, and extracted the *first* erupted lateral, feeling certain that I could by this operation make no mistake. Are there any cases on record, well authenticated, of as early development of a permanent tooth?—I. D. PEARCE, Kansas City, Mo.



TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The following case came to my hand about three weeks ago. Mr. W., aged twenty-five, received a blow on the face, the weight of which fell on the superior right central incisor, breaking it a full quarter of an inch under the gum,—a most peculiar fracture, as the process was full and firm. The broken part was attached to the gum by the lingual surface, and when removed presented the appearance shown in the illustration.



As the patient was averse to having the piece of root removed and a plate tooth substituted to fill the space, I explored the canal of the root *in situ*, and removing all trace of nerve-matter, found enough root for the support of the broken tooth. I stopped the apical foramen, and made a thread with a How screw-tap, and screwed a How post (platinum) into it. After enlarging and cleaning the root-canal in the broken fragment, I drilled completely through it into the lingual surface, and placed it in position on the screw-post, which extended down so that it just about appeared at the palatal opening. Removing the tooth, the palatal opening was enlarged to accommodate a nut (somewhat reduced in size by filing), and when the tooth was again placed in position, with thin oxyphosphate placed on the screw-post, the nut was set up firmly, the tooth was made whole again, and no soreness has resulted. The small cavity below the nut was filled with oxyphosphate, which I shall

replace with gold at some future time when there will be no danger of irritation.—F. A. KNOWLTON, D.D.S., Fairfield, Me.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—Dr. Pruyn and myself have been using trichloroacetic acid, ten per cent. solution, in treatment of calcic inflammation and pyorrhea pockets, with better results than anything we have ever used. For myself I have been using it with good results for obtunding sensitiveness at the necks of the teeth. For treatment of the incisors this discovery will be a very important one should future experiment establish its value for this purpose.

We have not been able to secure sodium peroxid, but will be able to report on it later.

We are very much pleased with pyrozone, five per cent. solution.—J. AUSTIN DUNN.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED FROM APRIL 4 TO MAY 16, 1893.

- April 4.*—No. 494,617, to JOHN L. BAKER. Head-rest.
April 11.—No. 495,267, to C. M. RICHMOND. Hand-piece.
April 18.—No. 495,607, to GEO. F. BARNEY. Hand mallet.
 “ “ No. 495,893, to EDW. C. MERRILL. Artificial tooth.
May 9.—No. 497,122, to C. F. GARRETSON. Articulator.
 “ “ No. 497,144, to LEVI TEAL. Pedal switch.
May 16.—No. 497,370, to H. T. EACHUS. Brake for dental engine
 “ “ No. 497,723, to E. A. LEVERING. Dental flask.

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ORIGINAL COMMUNICATIONS.

PROFESSIONAL ETHICS.

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(Read before the San Francisco Dental Society, October 10, 1892.)

IN the DENTAL COSMOS for May, 1892, appeared a paper from the pen of Dr. Ottolengui, prepared for and read before the First District Dental Society of the State of New York. In it the doctor, after showing the humble origin of the existing formal declarations of duty, or "codes of ethics," so called, medical and dental, and presenting some points of weakness of these codes, raises the question whether the codes are in any way beneficial, and, if I understand him correctly, urges the abrogation of the dental code. Dr. Ottolengui's paper, as might be expected, elicited discussion; and from the discussion, which is published with the paper, it appears that other prominent men favor the abrogation which Dr. Ottolengui suggests. The doctor's proposal was received by leading men with acclamation. Its reception was that of a spark falling on ready-prepared tinder.

Such a change as that proposed is a serious matter. It is not to be too strenuously advocated, certainly it is not to be adopted, without long and careful thought, without full consideration. Even the alternative proposed by Dr. Ottolengui—a radical revision of the code—is not to be advocated lightly. It is fair to presume that, in a matter of such gravity, the gentlemen who applauded the more iconoclastic of the doctor's proposals had previously looked over the territory well. It is therefore startling to note that the subject-matter in which there is proposed so great a change, or such great changes, has never received, within the bounds of our profession, nor (as far as I am aware) beyond those bounds, comprehensive public study—overt scientific and practical examination. The thunderbolt falls from a clear sky. A revolution unprecedented in magnitude is born in an instant, with no preliminary period of gestation, without any appearance of that preparatory study and formative deliberation which we naturally expect, and which is considered indispensable by careful or conservative men.

Under these circumstances, it is not to be expected that thoughtful men in general will receive Dr. Ottolengui's proposal with enthusiasm. Under these circumstances, I was not surprised, shortly after the appearance of the journal mentioned, at a request from Dr. Van Orden to give the matter attention, with a view to the formation of a sound opinion on the question presented. It seemed to me then, and it now seems to me, that every thoughtful and conservative man must feel, as Dr. Van Orden evidently felt, that a great subject had been brought forward but not illuminated, and that light is needed; that before advocating a change, and even before ceasing to earnestly advocate the existing order of things, we must have more than the fact, graphically presented by Dr. Ottolengui, that evils exist under the present *régime*, and the further fact that some men, without a manifestly full and decisive reason, favor the alteration. It seemed to me, and I am sure it seemed to Dr. Van Orden, that there was needed light, and, for light, the great illuminator—that which, more than any other one thing, shows man the truth and illuminates his path—discussion. I therefore complied with Dr. Van Orden's request to prepare for a debate. I reviewed Dr. Ottolengui's paper, and reflected on the question raised. At our next meeting Dr. Van Orden and myself entered into a discussion, as we had intended. Then it occurred to us that on a matter as large as the ethics of professional life an informal debate could scarcely be rendered fruitful; it was necessary to go over the subject systematically, which it is difficult to do in private conversation. Another matter, too, came forward: the truth that, in discussion, the more who participate the greater the number of ideas advanced, and consequently, in complex subjects (all practical subjects are complex), the greater the illumination. We therefore resolved to make our discussion formal and public,—formal, that we might obtain the advantage of system in our examination; public, that we might have your aid in the solution of the problem. We also determined to postpone our debate till the close of the summer meetings, that we might have, as nearly as possible, your undivided attention.

Thus it is that we come before you to-night. We hope to lay the foundation of a vigorous and prolonged discussion, both public and private, the result of which shall be a wider view, a clearer and more correct and more uniformly accepted view, than has yet been attained, of the essentials of professional ethics. To me has fallen the work of opening the debate,—of analyzing the subject, bringing it before you systematically,—of presenting the subject in form for fruitful review and showing the preliminary probabilities. Dr. Van Orden, who, as you all know, is more familiar than most of us with the history of the profession, will next give us a historical sketch, aiming to show the actual consequences of the adoption of the code; presenting us, as a result, a preliminary or provisional practical conclusion,—a conclusion which we may properly accept as a present or temporary ground of action.

Let me begin with a criticism of Dr. Ottolengui's paper. A more forcible plea for professional anarchy is scarcely conceivable. It is clear, terse, graphic in the extreme. What, then, is its substance? It is, as I have said, a presentation of some of the faults—some matters which, for present purposes, we may concede to be faults—of the

present code, together with an expression of deprecatory opinion regarding the sister code of the medical profession, by divers gentlemen of that profession. Neglecting the latter part of the paper,—the opinions of the eminent men whom the doctor quotes, some of them as beneath criticism (*de gustibus non disputandum*), others as presentations of reason too shallow to require our present attention (analysis which does not “go to the bottom”),—we have left Dr. Ottolengui’s statement of the evils which the code causes, or at least fails to correct. This statement leaves nothing to be desired. It is a model of concrete lucidity. It shows, with almost startling clearness, that improvement could be wished. But it shows only this, and if it were to be made a thousand times more lucid it could show only this. It is, with all its wealth of illustration, only a presentation of faults, and fault-finding can never show more than this; it can never show that the faulty object is evil, ought to be abolished. Everything in this imperfect world has its defects; fault can be found with everything; yet many things are desirable, in spite of their imperfections. The house in which I live is faulty; but I find it better than no house; I am not disposed to burn it down. And what is true of my house is true of useful things in general. Dr. Ottolengui engages to show a hundred faults in the dental code. I will engage to show a hundred in the constitution and laws of the United States and those of my own state or the state of Dr. Ottolengui. Yet I am far, very far, from advocating the abrogation of this broader “code of ethics,” to which, in spite of its defects, we are indebted for the greatest of—yes, for all—our blessings.

In a word, Dr Ottolengui, the validity of all he says being conceded, has not shown—has not even rendered it probable—that a dental code is an evil. Neither he nor any of those who have stated that they favor abrogation has given us a basis for the formation of a true opinion as to the fundamental utility or inutility of a code. The doctor has graphically—I may say brilliantly—directed attention to the subject of professional ethics. But there he has stopped, leaving us to explore the field for ourselves.

Turn, then, to our books. In which of them do we find the subject of ethics discussed? In none. What I said at the outset you will find to be literally true,—considering the importance of the subject, far too true,—that professional ethics has never, as a subject, received public consideration. Even the broad subject of general ethics has never been explored. There have, indeed, been scientific moralists, from the days of Aristotle downward, and especially since the modern renaissance of science. Portions of the territory they have mapped; but the subject as a whole they have not yet presented.

We must, then, begin at the beginning. Our first question should be, not, Is a dental code desirable? but the preliminary inquiry, What is ethics? It will be well, before we talk too freely on ethics, to know what we are talking about. We ought to get into the water before we begin to swim.

It seems superfluous to state that an acquaintance with ethics in general is needed as a preparation for the consideration of professional ethics. But experience has shown me that re-statement of first principles, especially first principles of logic, is rarely if ever amiss; that we are apt to lose sight of first principles, and need often to have

our attention re-directed to them. I shall therefore take the liberty of saying that, in order to understand any finite subject, we must see it in its place in the larger whole of which it forms part. Human knowledge is essentially cognizant of relations; to understand a thing, we must see its relations to other things. The corollary of this logical aphorism is plain: if we would have knowledge (not that baseless prejudice which the unthinking call "opinion," but knowledge) of professional ethics, we must see this branch of ethics in its place in the general subject; we must, in a word, look at ethics as a whole.

What, then, is ethics? In seeking an understanding of a subject, we may often obtain assistance by examining the etymology or searching out the origin of its name; this for the reason, mainly, that we thus go back to the infancy of the subject, and see it undifferentiated, in its simplest form, its "extreme case." Let us, then, begin our search for knowledge of ethics by seeking the origin of the word. It plainly comes from *ἥθος*, which signifies the character or nature of the man,—that cluster or combination of feelings or "sentiments" which govern the man, determining his thoughts and acts. As a derivative from *ἥθος*, we have the expression *ἠθικά* (plural in form, whence the plural termination of our word ethics), the science and art whose subject-matter is human character. The "ethics" of the Greeks included material which we exclude from the field, having assigned it to new and more special departments of knowledge. We have, though yet in embryo, as sub-sciences to the general science of psychology, a description of character (ethography) and a consideration of the causes which determine character (ethology, or, more properly, ethonomy). But our ethics lies wholly beyond these sciences; it is the art founded on these sciences.

Ethics, then, is the art of forming, or of guiding, or of forming and guiding, human character. What, now, is human character? The character of a man, in a broad sense, like the character of an atom or of a molecule, is the body, the bulk, the sum-total, of his affinities. But, in the special sense in which the word is practically used, the human character is that portion of the affinities or emotions of the man which render him human, which raise him above the brutes—the social affinities—the sentiments which create or affect the society or societies of which the human being is a member. In the human sense, no society, no character; wherefore, of course, no society, no ethics. And, since character depends on conduct, just as, reversely, conduct depends on character, ethics is the art of directing the action of individuals for the benefit of society.

We may now recapitulate, and pass onward. Ethics is an art, not a science. It presupposes an end, and it is a presentation of means for the achievement of that end. The end sought by ethics is the welfare of society. To this end minister the subsidiary or direct objects of ethics, the formation of character and the guidance of conduct. To this end minister also the practical formulæ which constitute the contents of the art of ethics,—rules of action, admonitions, precepts, laws; for ethics, like every other art, is a body of practical formulæ or rules for guidance. General ethics is a body of rules guiding the individual as a member of society as a whole.—of the nation or country, and of humanity at large. Subsidiary to this is

that section of ethics which includes our special subject, which section is class-ethics, the body of rules guiding the members of the social class.

Plainly, the members of every social class must be governed, first or foremost, by the rules of general ethics. The members of all classes must be devoted to the general welfare ; they must be true as citizens, and just and patient and benevolent, for general ethics directs, not so much the detail, what the individual must do, as the general, what the individual must be. But this is not all. Each class has special duties. With the military class, obedience to arbitrary command has an importance which it has not with the civilian class ; while, on the other hand, prudence has a place among the virtues of the civilian class which it has not among those of the military class. It is true that, in a young republic, like that in which we live, social classes are not as sharply separated as they are in older and more fully governed nations. But even now there are among us different social classes, with different duties (different ethical requirements), and, as our country grows older, the gulfs between the classes will widen, and the fact of special ethical requirements will become more generally recognized.

The first formative principle of class-ethics needs statement. We shall need it in our inquiry,—must, in fact, keep it constantly before us. It is this : The rules governing every class must be such as subserve the welfare of the community. To make this clear, let me re-state it in another form : The first object sought by the ethics of each class must be the welfare, not of the class, but of the community of which the class forms part. I purposely use in this statement the indefinite word “welfare,” to avoid the necessity of a lengthy analysis. My meaning, if not altogether clear by reason of the use of this misty word, will be clear enough for present purposes, while I have, for my use of this word, the warrant of all who have treated the subject of ethics scientifically, from Aristotle downward.

From class-ethics, we descend to professional ethics, the ethics of the professional classes. That the ethics of these classes must be dominated by the principle just referred to, need scarcely be said. A dental code, for instance, is not ethical unless it primarily furthers the welfare, not of dentists, but of the community to which dentists are tributary and which they should serve. I say “primarily furthers,” because the principle referred to does not interdict a regard on the part of dentists for the welfare of their own class ; it simply makes that welfare secondary, giving the good of the community first place. It says, Let the dental class seek its own good, embodying in its code (written or unwritten) rules to that end ; but let it primarily seek the good of the community as a whole.

Every item of every code of every profession should be tried primarily by the standard just named. It is not valid unless it will stand this test,—unless it furthers, or at least does not hinder, that general welfare for which the profession itself exists or should exist. Contrariwise, every rule which can be shown to be beneficial to the nation should be adopted. If, for instance, it should be shown that society as a whole is or will be benefited by a regulation requiring a periodical assembling of all the members of the profession for the interchange of ideas, the profession ought to make such a regulation.

The next criterion of a professional code is the welfare of the profession. This criterion is not entirely separable or fully distinguishable from that just named. The welfare of the society as a whole and that of the profession overlap; yet the two are not identical, and may even be, in some points, antagonistic. Without comment or illustration, I may arbitrarily state, without fear of contradiction, that every rule which can be shown to be beneficial to the profession, and not injurious to the state, should be formulated.

So much by way of definition,—by way of bringing our subject clearly before us. It is not for me to discuss this subject,—to consider, with any attempt at fullness, the desirabilities which have come out as its essence, or, more properly perhaps, as its object. But it is not for me to leave the matter without a fuller introduction,—without a preliminary rational investigation,—a presentation of the presumptions which should be provisionally accepted as a basis for full or practical inquiry. I will therefore raise here the question which Dr. Ottolengui has, with true logical insight, stated as that first to be solved,—the question whether a code is desirable at all; and, not attempting to give a full or final answer, will seek to show the preliminary presumption.

Perhaps both the state and the profession would be benefited, not by rules, but by absence of rules. This is a matter to be shown by evidence, and, if shown, it will rightly sweep away the professional code. For ethics, being an art, is purely a matter of utility. Whatever means will gain the object sought, gaining it without sacrifice of other equal or superior ends, and with least total sacrifice, is to be adopted, whether this means be action or inaction, legislation or *laissez faire*. It is not for me to endeavor to finally determine whether the objects named will be more readily achieved by a code or by its absence. It is my part, in presenting the subject for discussion, to lay before you only those matters which, being *prima facie* probable, we ought to assume till the contrary is proved. It is my part simply to give a basis for discussion, leaving complete exposition to others, and the decision of the matter to you all. I state my purpose thus fully, that I may not be misunderstood,—that I may not be supposed to have given or endeavored to give a full solution of the problem.

If, then, no evidence is offered as to the utility or inutility of a dental code, what shall we assume? Must we, in that case, hold that a code would be desirable or the reverse? At first glance, it would seem that the presumption would be against the utility of a code. It would seem, from the principle that action generally requires justification rather than inaction, that those who advocate a code must prove its usefulness. But let us look at the matter more critically.

In approaching the subject of professional ethics, we assumed and seemed obliged to assume the necessity of something corresponding to a code; the truth came out that every art has rules, and, insensibly, we assumed that rules are needed in the art of ethics. Seeking general truth in another direction, we note that every human social aggregate has something in the nature of ethical injunctions or rules of general conduct; though these rules may perhaps approach the governing principles of those herds or flocks of lower animals which expel or destroy their "wicked," in being unwritten and not very

definite. To this observation, which is a basis for an inference of non-analytical or descriptive character, we may add an observation which will give rise to a conclusion of synthetic or rational nature,—the observation, namely, that man is an intelligent (*i.e.*, imperfect) being; that, in other words, man is not, like the ant, completely adapted by nature to social life ("having no guide, overseer, or ruler"); the corollary of this observation being that man needs, for co-operation or organization, something which a perfect or purely instinctive being, like the ant, does not need,—something which addresses his intellect.

Take, now, a further step. Even if organization, professional or other, is possible without law, it is the rule, the presumption, that, in human aggregates or societies, law, even if not indispensable, is desirable. It is desirable especially for the protection, the security, the peace, of the better members of the community, those who may, by reason of their very goodness, excite jealousy or hatred. I am now speaking, let me say for distinctness, not about "unwritten law," but about that which is definitely formulated. Human aggregates, as a rule, need definite law, fixed law, for the perfect security of their members. Law, we must remember—formulated or written law—has a double action. Binding the receiver, it binds equally the giver. The ten commandments, which bound Israel to act ethically, bound the God of Israel to bless those who obeyed the "code of ethics." In the absence of law, Jehovah might do anything; the law, reacting, bound the deity himself. And what is true when the deity is the lawgiver, is true when the lawgiver is society at large. Our protection, our peace, in our daily lives, is due to the fact that our government is restrained by law. Aristides was just, but his justice did not save him. Why? Because of the lack of law. Lavoisier was innocent, but his innocence did not save him; he was sent to the guillotine from lack of law,—law to govern, not Lavoisier, but to govern the democratic government. And, in the absence of law, Dr. Ottolengui, though as just as was Aristides, as innocent, as great, as public-spirited, as was Lavoisier, might suffer at the hands of an ungoverned profession,—might suffer, as others have suffered, because of his very excellence.

Is this all? Is the presumption merely that all bodies of men, professional and other, need rules for organization and protection? No; implied in the need of rules for organization and protection, is the need of rules for guidance or direction. It is true that men may not need explicit rules for all their acts,—might not, hypothetically, need them for any. Ethics may be wholly matter, not of intellect, but of sentiment; the rules may not be expressed. Men may have "the work of the law written in their hearts," and have no formal expression of the law, like bees or ants. There may be an Edenic condition, a paradisaical anarchy, a non-existence of law through perfection, a "Paradise Regained." This is what Dr. Ottolengui desires, and believes immediately and fully possible as far as the dental profession is concerned,—an instinctive guidance, or guidance by pure instinct. On the other hand, men may have formulated rules; they may be guided by intellect, instead of by instinct or feeling. This latter may seem to be that which I have shown to be presumptively needed, but it is not. Man, being both an instinctive and an

intelligent being, needs, in matters generally, both instinctive guidance and intelligent direction, the guidance of both the heart and the head. In all matters, man is guided in the main aright by his feelings; he loves the good and shrinks from the evil, loves the right and shrinks from the wrong. Yet, in matters generally, he needs formulated rules for the detail of action. He walks instinctively, guided only by his feelings; but in practical walking he needs the admonition, "Keep to the right." This is true everywhere else in life. Is it not true in professional ethics? The burden of proof lies on him who makes the assertion.

The presumption, then, is that we do need rules in professional life. Assuming this (assuming it, not as proved, but as a matter which we ought to assume till the contrary shall have been shown), let us seek the presumptions as to the matters in which we most greatly need formulæ, and as to the character which our rules should have. Here general ethics is presupposed; we are assumed to be instinctively guided by the great general principles (as patriotism, humanity, justice, fidelity), which we cannot define, but which we feel as ruling powers in our lives, and intelligently guided by the formulated rules of society at large. Our question is purely as to professional ethics. It is, first, What is the presumption as to the scope of the professional code, as to the portion of the dentist's life which it should cover? and, second, What should be, presumptively, the general contents of the code?

It is assumed that our representative societies, which may be regarded as constituting the profession (not small special coteries, such as perhaps exist in some of our populous centers, but those general bodies, those state and district societies, under the headship of the American Dental Association, to which every practitioner looks for instruction and example, to which every reputable practitioner should of right belong, and exclusion from which should be, not a matter of personal dislike or unpopularity, but a certificate of unworthiness), are bodies not merely of scientific men, but of practical men as well,—that they are societies, not simply of scientists, but of dentists. It is further assumed that the proper object of these societies is not merely the advancement of the science which underlies dentistry, nor even simply the advancement of the science and the art of dentistry, but the improvement of the profession in usefulness and the advancement of its dignity. Neither of these assumptions is likely to be disputed. From them follows a presumption as to the scope of the dental code. It is that the ethical rules of the society should cover, not merely the action of the member at meetings, but also his conduct in his office and in his professional dealings with the world; not his conduct as a citizen, but his conduct as a practitioner of dentistry.

Such being, presumptively, the scope of the code, what, presumptively, should be its contents? Looking at the relations of the professional man, and noting that relation and rational duty correspond, we may segregate or classify professional duties. Without a lengthy analysis, I may divide the duties of the dentist (apart from or beyond his general duties as a citizen) into three groups: First, his duties to his country and to the general cause of humanity (not his duties as a citizen, but his duties as a professional man); second, his duties to

the laity ; third, his duties to the profession and to his professional brethren.

Having classified the duties of the dentist, and so laid a basis for a strictly rational examination, we may, in order to abbreviate, omit ; we may become less methodical ; we may glance at the existing code and at current discussion, and thus ascertain which class or classes of duties seem most to demand a formulated consensus of opinion,—an authoritative *videtur* ; after which we may confine our attention to the subjects thus shown to have most interest, and which are therefore likely to form the staple of that debate which it is our purpose to awaken. Reviewing our legislation and discussion, we find that the code considers matters in the second field, duties of the dentist to his patients, and that discussion relates mainly to matters in the third field, duties of the dentist to the profession and to his professional brethren. The “burning” subjects are: (1), advertising ; (2), secrets and patents in the matter of medicaments, processes, and appliances ; (3), fraternal assistance and its opposite, “professional jealousy.” An unprejudiced observer would probably say that our gentlemanly instincts appear to be sufficient to guide us in the higher field where self is forgotten, but fail to give us adequate guidance in that business competition and that general struggle for the “almighty dollar” which is one of the necessities of this unideal world.

Would the unprejudiced observer be right? The presumption is in favor of his being so. Therefore, assuming that he is right, let us glance at those matters which the wisdom of the ages has declared to require the attention of the law-making body, seeking the essence of those rules which, *prima facie*, seem to be needed.

The first of these subjects is duty to patients. Shortly since, a grocer said to me, “Smith’s baking-powder is the best ; but we always recommend Brown’s, because we make more money on it.” He closed with the query, “Did you ever know a person not to recommend that which was most profitable to himself?” I had been so long accustomed to the professional atmosphere, I had associated so long and so exclusively with professional men, with men who seek frankly the good of those who consult them, with men whose advice is ingenuous, that the *caveat emptor* startled me. Yet occasionally, in professional life, one sees something which shows the trade spirit of the grocer,—not that desire for gain which is professionally legitimate, but readiness to misadvise the patient, even to his injury, readiness to take advantage of the advisory position, betraying the confidence of the patient for gain. This does not affect the class of dentists to which Dr. Ottolengui belongs and with which he is most familiar, but there may quite certainly be found, outside of this circle, men who may be called trade dentists,—men devoid of the professional spirit, men who have entered our ranks, as the grocer entered the ranks of the grocers, seeking merely the emoluments of the “business,” the loaves and fishes. If there are such men, men who bring the *caveat emptor* of trade into professional life ; if there are men who, in cold blood, “work patients for their money” ; if there are men who tell their patients that they are ailing where they are not, and neglect the actual ailments of their patients, because such a course is most profitable to the practitioner ; if, to take a concrete or practical case, there are men who insert easy fillings where no fillings are needed, boring

holes for the purpose, while they are judiciously blind to gaping cavities because these present difficulties or uncertainties; if, in a word, there are men who use the superior knowledge of the practitioner, not for the benefit of the patient, but purely for their own benefit, perhaps even to their patients' injury; what is the presumption regarding a rule stigmatizing them, putting them into the position of outlaws? *Prima facie*, such a rule—a rule condemnatory of gross violation of that trust which the patient necessarily reposes in the professional adviser—is to be desired for the good of both the profession and the community.

I pass to the third field of the dentist's duties. Here the first subject which has received attention is advertising. On this I will say that it has a two-fold character. A man may (1) advertise the profession as conferring benefit on mankind in general or on those to whom it directly ministers. Or he may (2) advertise himself. The advertising of the profession—the heralding of the benefits which the profession confers—has rarely been a subject of society legislation. Individuals often object to it when it is done by individuals, on the ground that those who do it thereby render themselves conspicuous. But there has never appeared any general consensus of opinion against it. It is certainly free from the four great evils, calumny, mendacity, immodesty, or vainglory, and unprofessionality or lack of dignity, of which, in individual advertising, societies everywhere have endeavored to formulate their condemnation. What here are the presumptions? They are, quite clearly, (1) against rules apparently invidious of the acquisition of prominence by those who advance the profession; and (2) in favor of rules prohibiting such personal advertising, of whatever nature; as is, in the excellent language of the medical code, "derogatory to the dignity of the profession"; but not in favor of rules condemning all personal advertising.

Leaving with this brief word the much-discussed subject of advertising, I pass to the subject of secrets and patents. These have an element in common,—retention to the individual of special benefit from his discovery or invention. But the secret and the patent differ in this, that the secret is apt to die with the individual, and is not in his lifetime likely to benefit many except his immediate patients; whereas the patent becomes in a few years public property, and immediately becomes of benefit to the patients of every one, with the drawback only of an enhanced price during the life of the patent (which drawback is perhaps more than offset by the urgent presentation of the improvement to every practitioner by the patentee, as a result of his direct desire for gain). Leaving now the separation of these things, that is, merging them, we come to the common element in them: special profit to the individual through his discoveries or inventions.

In non-professional life, the question of the utility of giving special benefit to the individual who makes an improvement, and of rules or laws aiming to do this, has passed beyond the region of debate. There, however, the dominant principle is, "Every one for himself." With us the case is different. We stand mainly on the basis, "Freely ye have received, freely give." It is proper for me, here, to assume that our free giving to one another is a good thing, leaving the justification of this position to come later. This assumption

would seem at first glance to condemn utterly secrets and patents, and it would wholly condemn them if it were not for the facts : (1) that our organization neither makes nor can at present make provision for the support of infirm or aged members or their families ; (2) that our organization never has given, and does not seem at present able to give, an incentive which, like the patent law, will induce men to devote large amounts of time and money to research in the interest of material progress ; (3) that no public fund for such research has ever even been proposed. These latter considerations, especially when enforced by the further consideration that republics, proverbially ungrateful, never do anything, as monarchies have done, for public benefactors of any kind, introduce an "other side" to the question.

Going no further into the matter, what is the presumption ? It is, quite plainly, in favor of general rules condemnatory of secrets, at least of secrets which restrict benefit to the clientele of their possessor. The professional man exists for the good of others ; thoughtlessly, perhaps, but really he fails to fulfill his first duty, his duty to mankind at large, if he withholds from mankind the benefit of his knowledge. Leaving this view of the matter, and turning to consider it as it is usually considered in discussion, as a question of duty in the third field, we find that the professional man receives freely ; wherefore he should, as a rule, give freely. In our colleges, Dr. How truly says, we do not receive freely ; we must pay. But we do receive freely in our societies, in our journal papers, and in our informal meetings one with another. We receive daily. If one gives the results of a lifetime of study, he gives little in comparison with what he receives. No man is felt to be more worthy of reprobation than he who receives all and gives nothing. And, since the wisdom of all is far greater than the wisdom of one, however brilliant, and since therefore society at large will be better served by the collective wisdom of the whole profession than it could be by the naked personal ability of an individual practitioner, our sentiment here accords with that which, *prima facie*, utility demands.

But, as regards patents, the presumption is not at first glance plainly in favor of condemnation. A patent is a form of publication. It is a presentation of the new idea to others, with the drawback simply of its not being immediately free. The taking of letters patent is certainly not in keeping with the professional duty of free giving. But free giving must end somewhere ; there must be a limit to free giving, or the giver cannot live. You know that, theoretically, the professional man is a free giver, not only to the profession, but to the laity as well. He is supposed to have at heart the good of the laity, as a parent has at heart the good of his children ; he is supposed to care for his patients without regard for reward. He receives, not "wages," but an "honorarium" or "fee," that is, a gift, *honoris causa*, in recognition of his fatherly care. "Honor thy father and mother," says the commandment, which Paul interprets as a direction to contribute to the support of father and mother, to give an honorarium. You see the theoretical position of the professional man plainly in the law of England (English law being a museum of antiquities), which does not allow the barrister to sue his client for his fee, the fee being, in the theory of law, a gift, the professional man

being supposed to give his services freely, and therefore having no demand for compensation. You all recognize here, beyond the bounds of the profession, that there must be a limit to free giving ; may there not be a rational limit to it also within these bounds? May not the professional man rightly in some cases expect an honorarium from within as well as from without the profession?

Without trenching on the territory which is to be occupied by Dr. Van Orden, I may say that human history is largely a record of the advance of individualism. All human aggregates were once in fact what our profession now is in theory,—communistic societies. What is now the nation was once the family, ruled by the father or patriarch, and having, like the primitive church, "all things common." The duty of the primitive clansman was in fact to labor freely for the good of his "house," just as the duty of the professional man is now to labor freely for the good of his profession. The duty of the clansman, who has now become the citizen, has been profoundly modified. The citizen still owes his first duty to his "house," which has now become his "country," but he is no longer expected to give everything to his country, and keep nothing for himself. It has been practically ascertained that national welfare is promoted by the giving of good things, primarily, not to the public, but to their producer, and this whether these good things are material commodities or immaterial ideas (the latter having been to some extent accorded to their producers by patent and copyright laws). Now let us attend a little more closely. I have said that there is a difference between the professional man and the tradesman, in that the former stands on a broader basis of liberality than the latter. This is true. But the relation of the dentist to his profession and his professional brethren differs comparatively little from that in which the man considered as a citizen stands with regard to his country and his fellow-citizens. That is to say, we may take the case of the clansman or citizen in his relation to his "house" or country, and that of the dentist in his relation to his profession, as fairly parallel. What is true in the one case is, by analogy, presumptively true in the other.

So much as to the general. Let us look at the particular. The dentist's duty of free giving to the profession—his duty of "public service"—is, we have seen, important. So is the corresponding duty of the citizen. We may therefore profitably note that the rise of individualism in society has not only proved vaguely "beneficial," but that, especially, it has not diminished the public wealth nor the citizen's public service. The modern nation has, in spite of the rise of individualism—or should I say, because of this rise?—a greater *res publica* or common wealth than had the primitive family or tribe. And, though communism proper, in the sense of community of goods, has been limited, not extinguished, by the rise of individual right, social duty as a whole has not only not been abrogated, but has positively increased. The rise of individualism has been accompanied by a growth of socialism. The modern citizen owes to his country and to his fellow-citizens a thousand duties where the primitive clansman owed a dozen, and he is at least as ready to respond to the call of every duty as was his prototype and predecessor. Individualism has not eaten out the heart of the nation. It has simply made the citizen, in every way, a larger man.

Indulge me for a moment while, at this point, I return to the matter of the professional lay relation. I have said, summarily, that in this relation there must be a limit to free giving. Let me be more explicit. Originally, the professional man or man of wisdom, moved by desire for the welfare of the active man,—that is the thinker, desiring the benefit of the worker,—advised him freely, without thought of reward; the active man, moved by gratitude, responded with a gift. Presently, the gift or honorarium came to be expected; and it has now become, in most places, where the service is rendered to individuals, a matter of right, and is frequently stipulated for in advance, though the English barrister is still bound by the antique rule,—is not allowed to pre-contract for payment. But there is still one class of professional men which remains in the primitive position,—devoid of rights, bound in honor to give, but with no demand for a return. The class referred to is the highest of the professional classes; it corresponds to the high priest of antiquity. The men of this class—the Spinoza, the Newton, the Descartes, the Lavoisier—serve, not individuals, but society as a whole. Notice now under what disadvantages some of the greatest of the world's professional work has been done. See the Spinoza, starving in a garret, pursuing those studies, invaluable to mankind, which must bring peril rather than profit to their pursuer. See the Herschel laboring as no one but a giant could labor, earning his bread as a musician, while making those astronomical instruments for whose construction he was too poor to pay, and carrying out those astronomical investigations which were expected, not to bring him money, but to give knowledge to mankind. To come nearer home, look at John Hunter; he was not, indeed, at any time excessively poor, and during the last few years of his life he had a lucrative practice; but the fact that the entire returns of this practice were spent in the work to which he devoted his life shows that the struggle of his earlier years was not mild,—the struggle to obtain material for those investigations whose results we enjoy,—the struggle, not for himself, not even for his family, who were left penniless at his death, but for mankind,—the struggle to create the science, then sneered at as useless, but now welcomed as most serviceable, of comparative morphology. Men of genius are rare, but rarer still are those who, in addition to genius, possess the ability or the temper to patiently starve, to endure poverty and adhere to their public work. This is shown by the fact that a disproportionate amount of the work of this class has been done by men who had wealth (as Buffon, Ricardo, Bentham) or held sinecure positions (as Bacon, Newton, Lagrange, Kant, Faraday, Adam Smith, Mill, Pasteur). Consider now the probability that, often, men who are intellectually able to give much to society are restrained by lack of means; contrast the small amount of the pure scientific work of the world with the large amount of the legal work which is done for clients who pay, and say whether, if it were possible to give a right of payment to the highest class of professional men, the world would not be the gainer. Having answered this question, answer, not summarily, but deliberately, the other,—whether, as regards those professional men who serve individuals, the establishment of private right has or has not been advantageous to society.

I must not go further. I have already exceeded proper bounds.

I will simply state the apparent presumption from the data which have been given, which presumption, of course, it will be for you to revise, and to overthrow if erroneous. It is that, if, generally, individualism has worked well, and if, in a nearly parallel case, the rise of private right has neither diminished public duty nor that public spirit on which public duty depends for performance, and if, in one of the relations of the professional man, the creation or establishment of a private right for him has proved beneficial; then, in the absence of any provision for the public reward of our public benefactors, we ought not to censure them if they seek, in a way not demonstrated to be injurious to the profession or the public, some personal return from that study of which they give us and the world the benefit.

The third matter which has presented itself as apparently requiring attention, is mutual aid,—helping one another in difficulty; and its reverse,—“professional jealousy.” I believe that, as a fact, the segregation of the medical profession from the body of the community, or, rather, its retention of separateness after the priest had faded into the physician, and its modern organization (which has been followed by a like organization of the dental profession), is to some extent due to the need of this aid; in particular, to the fact that the practitioner is usually censured by the ignorant multitude when he fails to effect a cure, and then needs the support of his fellow-practitioners. Yet in this matter of mutual aid, especially in the matter of standing by one another before the laity, neither the medical nor the dental profession can be said to have acquired an unquestioned reputation. It is whispered behind the scenes that ungenerous detractors of fellow-practitioners have sometimes been made; and it has even been hinted that, in the extortion of “blood money” from practitioners, flagrant wrongs have been committed by practitioners. If there be truth in these rumors or surmises, there is a presumption in favor of a rule deprecating professional slander. Under these circumstances, to an external observer, a code must seem trivial, if it condemns a man for a form of advertising which is free from the vice of detraction of others, and fails to condemn him who maliciously endeavors, by aspersion or innuendo, to injure a gentleman or destroy a worthy rival; it must seem, indeed, to strain at a gnat and swallow a camel if it condemns a man for announcing the unmalicious fact that he will furnish the cheap services which poor people need, and has not a word of reproach for him who procures to be brought and supports by his testimony in court an unjust suit for malpractice against a brother practitioner.

Into details or into proofs it is not my part to enter. I have undertaken simply to bring before you (and this not by exhaustive analysis, but in a general way) the first truths of the subject,—those which may serve to awaken thought and to form a basis for a working hypothesis,—a provisional *a priori* judgment. Such a judgment is, however, let me say distinctly, not to be accepted as a ground of action. It has its value as a hypothesis,—a basis for further investigation. But, in complex subjects, such as that with which we have to deal, *a priori* reasoning (even if it be apparently exhaustive) can give us only this; an *a priori* consideration is valuable only as giving a general illumination. For an opinion which may be accepted as a reliable basis of practice, we must look, not to analytical reasoning, nor even to distant analogical reasoning, but to direct experience,—must see what, in fact, are found to

be the results of certain courses or certain measures in the conditions which exist. This *a posteriori* consideration will be introduced by Dr. Van Orden. He will show us, to such extent as is possible in a limited time and with the limited means of knowledge which an individual possesses, what, historically, have been the results of our organization and of the adoption of law,—isolating, as far as possible, from the results of organization, those of the adoption of law, and showing perhaps the effects of the adoption of some particular laws. If he shall show us that these results have been evil, then, reason to the contrary notwithstanding, he will show that the code should be abolished. But if he shall show us that the results of the code, though faulty in some respects, have been in the main good, it will be the part of wisdom to hold fast to that which we have,—holding it firmly till something else shall have been, not hypothetically guessed, but experimentally shown, to be better,—making changes, indeed, when and where they seem to be needed, but making them cautiously, at first experimentally, and assuredly not going to the length of uprooting the vine if it shall be shown to have borne good fruit. Certainly the fact that a thing was once good does not prove that it will be always good. Changing circumstances change requirements. The dress becomes in time too small for the growing boy. But the burden of proof lies always on him who advocates change. And the criterion of desirability in complex matters, such as ethical codes, is, let me reiterate for emphasis, absolutely and only, experience,—practically ascertained or actually observed results. Reason, with all its pride, gives us but a glimmering and uncertain light. Fault-finding may be well, as leading us to seek improvement; but it can never be a guide. The glittering vagary of the Utopian reformer, though it may suggest valuable experiment, is always to be distrusted; it is, with its extreme rejection of existing good, a dream incapable of practical realization,—only a dream, the thinnest, the nearest to nothing, of all *ignes fatui*, misleading and miring invariably its followers. The one safe guide, the only one, is examination of results,—not a search for blemishes, but a candid looking at the whole. The tree is always and surely to be known by its fruit. Men do not gather grapes of thorns, nor figs of thistles.

CARIES OF THE TEETH IN AN AFRICAN MANATEE (MANATUS SENEGALENSIS).

BY W. D. MILLER, M.D., D.D.S., BERLIN.

DURING the last ten years I have made various minor contributions to the question of caries of the teeth of animals, and my observations, together with those of Kitt, von Kerschensteiner, and others, have established the fact that the appearance of caries of the teeth in animals is by no means an occurrence of great rarity.

The result of these various investigations has shown that especially herbivorous and omnivorous animals, and among these again mostly the domestic mammals, are subject to dental caries: dogs that are fed from the table, horses, etc. Monkeys also quite frequently suffer from caries.

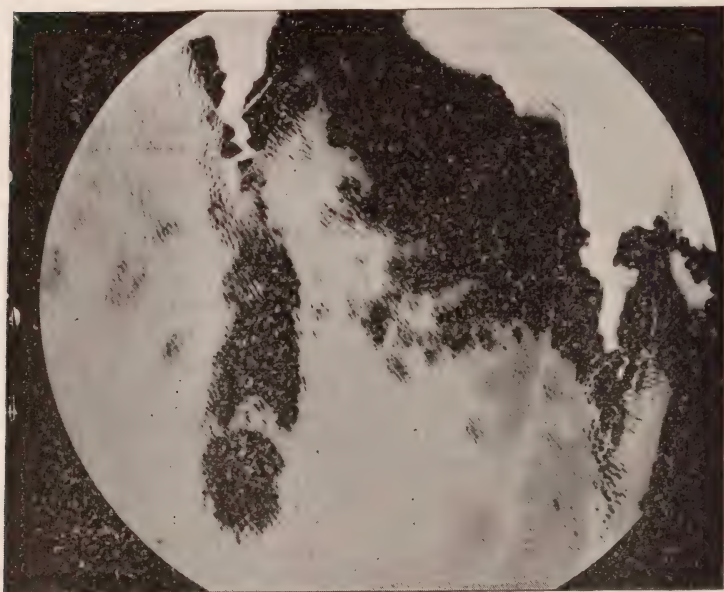
On this occasion I do not, however, intend to treat of the question

in general, but only to call attention to a case of dental caries in an order of the mammalia, in which, as far as I know, caries of the teeth has never before been observed.

In the collection of the Berlin Dental Institute there are two skulls of *Manatus Senegalensis*, in one of which the majority of the teeth are more or less decayed. The *Manatus* is a species of the Sirenia (sea-cows), which belong to the suborder of the cetaceans, styled *Natantia herbivora*, or herbivorous cetaceans, in contradistinction to *Natantia carnivora*, or carnivorous cetaceans. The species in question, *Manatus Senegalensis*, inhabits the west coast of tropical Africa, lives in the ocean and in the mouths of rivers, feeds upon sea-weeds and other water plants.

The dental formula of the manatee of Senegal is $i \frac{1}{0}$, $m \frac{10}{10}$.

FIG. 1.



The incisor is a deciduous tooth, and is lost at an early age. The molars develop in succession from before backward. The crowns of the molars are approximately cube-shaped; they have a broad, flattened approximal surface, and become somewhat narrower toward the neck. Their shape, therefore, favors the retention of particles of food, particularly in the interstices of the necks. Nevertheless, I was very much surprised to find cavities, particularly in such numbers, in the teeth of a sea mammal.

It would be very natural to suppose that an animal whose mouth and teeth are almost constantly washed with water, especially with salt water, could never suffer from caries of the teeth. It seems, however, to be an established fact that the manatee passes much of his time with his snout out of the water. Some observers report that he often

crawls out of the water to feed upon plants on the shore. This statement is disputed by others. We have, however, the best authority for the statement that he "eats so much that his stomach and intestinal tube are completely filled with food, and then, when he is satiated, often lies down in shallows, so that his snout extends out of the water, . . . and sleeps away several hours in that position." (Brehm's "Animal Life".) During this time the fermentation of the vegetable matter lodged between the teeth might well take place.

I laid one of the carious teeth in water for twenty-four hours in order to soften the carious dentine, which had become exceedingly dry and hard. After this time I scraped out a small piece with a spoon-shaped excavator, and prepared sections of it on the freezing microtome, which were then colored after the Gram-Günther method. They showed under the microscope the same appearance with which we are familiar from the study of caries of human teeth. (See Fig. 1.)

On account of the extreme dryness of the dentine, I could not succeed in obtaining specimens well adapted for examination with high power. It could, however, be readily determined that the caries was due neither to a mixed infection, as in human teeth, nor to an infection with a pleomorphic species of bacteria. Some of the forms present are represented in Fig. 2.

FIG. 2.



NASCENT OXYGEN.

BY EDWARD C. KIRK, D.D.S., PHILADELPHIA, PA.

(Read before the Susquehanna Dental Association, May 17, 1893.)

THE extensive use which is now being made of hydrogen dioxid in surgical and dental practice as a germicide, a destroyer of pus and of effete organic matter, is a sufficient warrant for a study of the principles upon which this and allied compounds depend for their activities. Such an investigation may be profitably undertaken with the hope of arriving at a more definite understanding of their valuable properties and range of usefulness as applied to the treatment of cases in practice. For our present purpose we may group together in one class a number of oxids generally known as peroxids, which have as a common and characteristic factor an additional atom of oxygen in their composition over and above that contained in the normal oxid of the same base or positive element. For example, we have—

Normal Oxids.

Hydrogen oxid (water), H_2O .
Sodium oxid, Na_2O .
Magnesium oxid, MgO .
Barium oxid, BaO .

Peroxids.

Hydrogen peroxid, H_2O_2 .
Sodium peroxid, Na_2O_2 .
Magnesium peroxid, MgO_2 .
Barium peroxid, BaO_2 .

The number might be almost indefinitely increased, but the examples given will serve to illustrate that the peroxids in the cases cited differ in composition from their respective normal oxids simply by the addition of an extra atom of oxygen to the molecule.

At this juncture it will be well to recall one or two points respecting the elementary laws of chemical combination, so that we may more easily understand the principles upon which the oxidizing property of

these several peroxids depends, and just why and under what conditions we can take advantage of it. Chemistry has been well defined as "that branch of physical science which treats of the atomic composition of bodies and of those changes in matter which result from an alteration in the kind, the number, or the relative position of the atoms which compose the molecule." It will be seen from this that chemistry concerns itself solely with the composition of the molecule. Its query is, Of what does the molecule of matter consist, and how are its constituent parts related to each other in kind, number, or relative position? It will also be seen from the foregoing that all chemical changes in matter affect its composition by in some manner or degree affecting the character of the molecules of which it is composed, in which respect chemistry is distinguished from physics, which deals with the relations of molecules and masses of matter. The difference is easily distinguished when we examine a substance like sugar. For example, we may dissolve a lump of sugar in an indefinite amount of water, and carry the dilution so far that we may easily conceive that the particles of sugar have been divided to such an extent as to bring about a separation between the ultimate molecules of sugar. And it is further conceivable that if our senses were sufficiently delicate to detect and recover one or several of these ultimate particles they would each or collectively exhibit in their own degree the properties of sugar,—viz, sweetness, crystalline character, transparency, etc. The dilution of the sugar by solution in water has wrought only a physical change without affecting its composition. If, however, we subject a particle of sugar to a sufficiently high temperature,—place a lump of sugar on a hot stove, for example,—another kind of change takes place: steam is given off, the mass darkens, becomes black, and finally nothing but a porous mass of coke remains. A chemical change has taken place; the molecule of sugar has been broken up into its constituent elements, and it is these elements of carbon, which remained as coke, and the oxygen and hydrogen, which passed off as water-vapor or steam, which were the atomic constituents of the molecule of sugar.

This difference between the atom and molecule it is desirable to keep in mind while studying the properties of the substances under consideration, which owe their value to the oxygen which they readily yield up under the proper conditions.

Another point which should be noted also is that atoms are indivisible. They are the theoretically ultimate particles of matter, and always represent elementary matter. They never exist in a free or uncombined state in nature. Either identical atoms unite in groups to form elemental molecules, or dissimilar atoms combine to form molecules of compound matter.

Atoms are bound together in molecules by the force known as chemism or chemical affinity. This force differs in degree and intensity between different kinds of atoms. It is less between similar than it is between dissimilar atoms; or otherwise expressed, a given atom will combine preferably with one of dissimilar character to one which is similar to or identical with itself. This question of the relative chemism or the relative intensity of chemical affinity between similar atoms on the one hand and dissimilar atoms on the other is of importance to a clear understanding of the constitution of the group of peroxids which we are considering, and especially in its relation to

their activity as oxidizers. The simplest compound of the group, and in some respects the most important in its relation to dental and surgical therapy, is the peroxid of hydrogen, or more correctly, hydrogen dioxid. We can obtain a clearer idea of its composition and properties by first studying the structure of the water-molecule, which is, chemically speaking, hydrogen monoxid. The dioxid is immediately derived from water by the simple addition of another atom of oxygen to its molecule,—thus $\text{H}_2\text{O} + \text{O} = \text{H}_2\text{O}_2$,—and in this we have the plan upon which the other analogous peroxids are constructed, as they are all formed upon a common type. The analysis will, in addition, furnish us with an explanation of the characteristic oxidizing property which they all have in common.

The molecule of water consists of two atoms of hydrogen united to one atom of oxygen, and is expressed by the formula H_2O . It has been found by chemical research that the atoms of elementary bodies differ from each other in the *quantity* of their combining power. They also differ from each other in relative weight, but the quantity of combining power has nothing whatever to do with weight; it may, to some extent, be likened to the relative purchasing power of a number of coins which might differ greatly as between two coins whose weights were nearly or quite equal.

The atom of hydrogen being the unit of comparison,—as it is the lightest of all known bodies,—its atomic weight is stated as one (1) and its *quantity* of combining power is also one (1), while the other elements have a combining power expressed by 1, 2, 3, 4, 5, 6, and 7,—*i.e.*, their combining power or quantivalence is that many times greater than the combining power of hydrogen, which is the unit of comparison. The quantivalence of oxygen is twice as great as that of hydrogen, hence to perfectly satisfy the demands of oxygen in its combination with hydrogen we require two hydrogen atoms for each oxygen atom; hence the formula for hydrogen monoxid, or water, is expressed by H_2O . The composition of the water-molecule may be graphically expressed as $\text{H}-\text{O}-\text{H}$, which shows the manner in which the two hydrogen atoms are supposed to be linked together by the oxygen atom in this compound. By the addition of another atom of oxygen to the water-molecule we have hydrogen peroxid, H_2O_2 , which may be represented graphically thus: $\text{H}-\text{O}-\text{O}-\text{H}$. In this case we have two similar atoms of oxygen united to each other in the molecule; these in turn united by their terminal bonds to an atom of hydrogen.

The structure of the hydrogen-peroxid molecule shows it to be a weak one, for, as has been already stated, the affinity between similar atoms is much weaker than between dissimilar atoms, hence a compound having a structure like hydrogen peroxid, in which similar atoms are directly united to each other, is inherently weak, and tends to decompose readily under circumstances which favor a rearrangement of its constituent atoms,—that is, when brought into molecular relationship with the atoms of a dissimilar compound with which such a rearrangement can be effected.

The readiness with which hydrogen peroxid parts with its extra atom of oxygen is its chief characteristic, and it is this which makes it so valuable as a therapeutic agent. Its activity as an oxidizing substance is not due solely to the fact that it gives up oxygen, but for the especial reason that it yields its oxygen up in its active or nascent

condition, and it is this nascent or active state of oxygen which concerns us at present. The ordinary characteristics of oxygen gas are sufficiently familiar. Its energy as a supporter of combustion, its relation to vital processes, its incessant activity as the essential agent in all processes of organic decomposition, are well known and everywhere noticeable; and if the activity of hydrogen peroxid were due solely to the oxygen which it is so ready to give up in contact with effete organic matter, we might ask, Why would not the pure gas, or a solution of oxygen gas in water, answer for the same purposes? The reason appears to be related solely to the differences between the molecular and the atomic states of the gas. Pure oxygen, after being set free from any of its compounds, or when collected in bulk, has its atomic particles in the state of aggregation which we call molecules. Experiments have proven that the oxygen-molecule contains two atoms which are directly united to each other; their chemism is mutually satisfied, and they are therefore in a state of comparatively stable equilibrium. This condition of oxygen is known as its passive state, and is the state in which we are most familiar with its properties.

When, however, an oxygen-holding compound is decomposed so that the atom of oxygen which it contained is liberated, we know that it is set free in its atomic state, the condition in which its affinity has not been satisfied or neutralized, hence its properties are most active. We can conceive of a brief interval of time which must elapse before the atoms of oxygen have united with each other to form molecules of the gas. If at this stage the atoms of oxygen are brought into contact with molecules of a dissimilar character with which they can combine, they will so unite with great energy. It is this atomic state of oxygen at the moment when it is being set free which is called its nascent state, or state of being born, as it were, where its most energetic activity is manifested.

It is now perhaps clear why a solution of hydrogen peroxid is possessed of chemical activity so greatly beyond a simple solution of pure oxygen gas in water. When hydrogen peroxid is broken up in contact with effete matter,—pus, for example,—it gives up its oxygen in the atomic condition. Before the oxygen atoms can unite with each other to form molecules, and so have their affinities to a certain extent self-neutralized, they exert their intense activities upon the organic matter and destroy it. The loss of its extra atom of oxygen simply reduces the hydrogen-peroxid molecule to the monoxid or water; thus H_2O_2 decomposed $= \text{H}_2\text{O} + \text{O}$.

It is evident from the simple theoretical examination which we have thus made of this compound, that it possesses unique and valuable properties as a destroyer of effete organic matter. It depends for its activity upon its nascent oxygen, and its by-product is water, both of which are non-poisonous and without deleterious effect upon vital tissue.

All of the peroxids in the group cited possess strictly analogous oxidizing properties by virtue of their loosely held extra atom of oxygen. They differ relatively from each other by reason of the differences in the several positive atoms which constitute the variable factor of the group, and which impress in each instance the individual character upon the molecule of a given member of the group. Their relative activity as oxidizers varies with the chemism between the

oxygen and the positive atom in each instance, so that this factor, in connection with the chemical and therapeutic character of the positive atom in the peroxids, determines their range of practical application. The uses of the hydrogen and the sodium peroxids have become matters of record. A possible usefulness for the magnesium peroxid in connection with the treatment of discolored teeth seems to be indicated by the desirable properties of its decomposition products,—viz, nascent oxygen and magnesium oxid; thus $\text{MgO}_2 = \text{MgO} + \text{O}$. The magnesium peroxid is easily made by the mutual decomposition of sodium peroxid and magnesium sulfate. The reaction is as follows: $\text{MgSO}_4 + \text{Na}_2\text{O}_2 = \text{Na}_2\text{SO}_4 + \text{MgO}_2$. When magnesium sulfate and sodium peroxid are mixed in equivalent proportions the reaction takes place, and the mass may be packed into a discolored tooth and left for several days or weeks. The reaction between the magnesium peroxid and the organic matter in the canal and tubuli takes place very slowly, so that the evolution of nascent oxygen proceeds continuously over a considerable period of time. The magnesium oxid, which is the secondary product of the reaction, is perfectly white, and serves as a background which greatly assists in improving the appearance of the tooth.

I have made but a limited number of experiments with the magnesium peroxid in this way, and then only after the use of sodium peroxid, which I believe to be unequaled as a detergent and bleacher of infected and discolored dentine.

SOME THOUGHTS UPON PYORRHEA ALVEOLARIS.

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(Read before the Dental Society of the State of New York, at its Twenty-fifth Annual Meeting, held in Albany, May 10 and 11, 1893.)

WITHIN the realms of dental pathology, I know of no single subject that demands so much of scientific and intelligent observation as that condition which we call pyorrhea. The etiological problem which has vexed dentistry ever since it had an organized existence—that of the origin and cause of dental caries—has been practically solved. But concerning the next most common and destructive disease of the teeth there is no intelligent and consistent theory that is accepted by any considerable proportion of dental pathologists. Those who do essay its cure are at work in the dark, and the remedies used are altogether empirical, while the great body of dentists do not attempt any radical remedial measures whatever, but assure patients that the disease is incurable, and stand idly by and philosophically witness the destruction of the organs which it is their accepted duty to save.

This condition of affairs is not at all creditable to us. We sometimes reproach medicine that it has not yet learned the pathology of many diseased general conditions, but here is our second greatest enemy stalking the field in contempt of our efforts, clothed in a coat of mail that has so far proved impenetrable to our most polished weapons. It is time that we became awake to the situation, and set about the study of it with some degree of persistent and intelligent

earnestness. I can well remember urging in the American Dental Association the formation of a section of etiology, when the origin of dental caries was as much a mystery as now is that of pyorrhea. With others, I argued that it was to our discredit that so many contradictory theories were urged concerning that condition most destructive to teeth, and that none was generally accepted. That movement culminated in the stimulation of Miller to his famous series of exhaustive observations, and the solution of the problem. Why should not another general movement for the study of pyorrhea end in the production of another Miller, or the incitement of the original one to another series of experiments, that shall end in the determination of the true character of this dread destroyer, and the discovery of some certain means of combating it?

The causes to which pyorrhea is ascribed by different generalizers are too numerous to recapitulate. I say generalizers, because I know of no one who has made any such series of original observations as will entitle him to be called anything more than a collator, or theorizer upon generally observed facts. One declares it connected with a gouty or rheumatic diathesis. If this is an important factor, we should never be able to detect true pyorrhea without such a pathological condition, nor should there be any marked case of that disease separate from gouty troubles. The facts indicate that it is present when there are no symptoms of such a condition.

Another would connect it with some form of uterine troubles; but, unfortunately for the advocates, it is not confined to monodelphic females. Still another attributes it to an inordinate use of common salt. But the scurvy that afflicts people who are deprived of fresh vegetables is not true pyorrhea, which, while it may be confined to people who use salt as a condiment to a greater or less extent, seems to exercise a kind of selection among them that is inconsistent with the theory. When the real cause of the disease is finally determined, it will of course be that which always, under specified conditions, will produce it, and without which it will never be found. Short of that, any definite state may be a factor, but it cannot be the real cause, and in this view the etiology of pyorrhea is yet hidden in mystery.

The term pyorrhea alveolaris means simply a flow of pus from the alveolus, and would thus include all septic conditions of that process. But by common consent the meaning is limited to a discharge of septic matter about the gingival margins, though the actual source of the pus may be deep within the tooth-socket. Miller says there are without doubt three factors active in producing this disease,—a constitutional taint, a local irritant, and micro-organisms. This is undoubtedly true, yet to my apprehension they are not all equally active in different conditions, nor are all of them necessarily factors in every case of that which is usually called pyorrhea.

I think I can recognize at least three different phases of the disease, each perhaps having its own special etiology and distinctive symptoms, and each demanding treatment peculiar to itself. I will endeavor as briefly as possible to sketch the probable etiology, the symptomatology, the pathological changes as I have observed them, the prognosis, and the course of treatment that I have adopted with the best success in each case.

GINGIVAL PYORRHEA.

The characteristic appearance of the first condition which I will consider consists mainly of an inflammation of the margins of the gums, or a gingivitis, distinguished by the presence of pus and the breaking down of tissue, caused by a purely local irritant. It commences with a kind of stomatitis of a follicular character, and localized at the gum-margins. This is not always the result of a lack of proper care of the teeth, but it may be a local manifestation of a general atony. The mucus follicles, which are numerous and somewhat specialized at the gum-margins, show degeneration in their function, and the condition of the secretion is materially changed, becoming irritating in its nature, and perhaps even excoriating. The gums are swollen and spongy, and are characterized in extreme cases by a kind of purple color, almost akin to that of necrosis. They are exceedingly turgid, but preserve their glistening appearance. They are somewhat everted, and the edges, instead of the sharply defined margins against the tooth, are rounded and thick. The inflammation, having its origin in the gum-tissue, proceeds to the pericementum, and there is a wasting of that, nearly evenly about the tooth, with the consequent absorption of the edges of the alveolar walls. There is an effusion of plastic lymph at the point of inflammation of the pericementum, and this is broken down by the continued irritation and the septic condition which follows, and the result is an almost constant discharge of pus.

Yet I consider this flow, as well as the destruction of the pericementum and alveolus, but secondary, and consequent upon the train of symptoms first described. There is little, if any, deposit about the necks of the teeth, and if it be present it is not a primary etiological factor, since the condition may exist and the teeth be entirely clear of any deposit whatever.

The etiology, while it may rest in a general atony, is not cachectic, but rather accidental. It begins with the follicular stomatitis to which I have referred, and which produces an altered condition of the follicles and of their secretion, and this of itself becomes the local irritant which intensifies the state.

The pathology consists in the morbid change in the follicles, and the hyperemic condition of the gums, with a great degree of œdema, or infiltration of the soft tissues, a pouring out of plastic exudate and its infection and breaking down, all these in turn, by contiguity of tissue and by local irritation, producing an inflammation of the pericemental membrane, with osteitis and wasting of the edges of the alveolar walls. It is this condition which is so frequently mistaken for a worse one, and in my opinion this is the class of disturbances, marvellous cures of which are so often related in journals and at dental meetings, as the result of a few days of empirical medicament.

The treatment is simple and the prognosis always good. If there be a reduced tone of the system, tonics should be employed, with plenty of out-of-door exercise. The food should be generous, and every hygienic precaution should be used. Massage of the gums with the ball of the fingers, and by the frequent use of a rather soft brush, should be resorted to. Some form of mild cauterant may be applied at the margin of the gums, and ropes of cotton wet in it

should be pressed down beneath them to the edge of the alveolus. I have found aromatic sulfuric acid extremely useful in such cases, but a dilute solution of silver nitrate, or of carbolic acid, or of the so-called Robinson remedy (carbolate of caustic potassa), or of trichloroacetic acid, are useful. Caustic pyrozone, a remedy that has lately come into use, is excellent, and I have had remarkable results from it in such instances. Some antiseptic mouth-wash should be employed, and for this purpose I have found nothing better than listerine, which may be used in full strength upon the brush, or diluted with five to ten parts of water as a mouth-wash or gargle.

Some stimulating astringent may be employed as an occasional dressing, and for this I have found a solution of chlorid of zinc, five to ten grains to the ounce, excellent. Of course general remedies are indicated if the condition be only a local manifestation of a general anemia and malaise.

NODULAR PYORRHEA.

The second condition which I wish to describe is marked by another train of symptoms, and its pathology varies from the first. The initial manifestation, so far as I am aware, consists in the deposit upon the periphery of the root, at some point, of a hard, dark, closely adherent nodule of calcific matter. This may increase until the whole side of a tooth may become involved. As it characterizes the condition, it may be well to consider this deposit more particularly.

It differs from the usual calculus found upon exposed portions of a tooth or dental plate, not only in color and density and general appearance, but in locality. The usual tartar is from the saliva, and is precipitated, as is the lime which forms the coating on the inside of tea-kettles and boilers. The calcium is held in solution in the saliva by an acid, which in a healthy, normal condition it nearly neutralizes. Coming in contact with the carbon dioxid of the breath, a carbonate is formed, which is precipitated.

But the chemical formula of the deposit which causes or accompanies the condition that I am now describing, is different. I have not at hand any exact analysis of these deposits, but I believe it to be the fact that there is a larger percentage of phosphate, and a smaller of carbonate of calcium, than in ordinary deposits. Its origin is not from the saliva, and hence it cannot be called salivary calculus. Undoubtedly it must be derived in some way from the blood, and hence it has, by Dr. Ingersoll, been named sanguinary, and by Dr. Black, serumal calculus. Either term is quite correct. Black, in his paper in the first volume of the "American System of Dentistry," says that he believes the deposit to be the result of any irritation of the gingivæ which will cause them to weep a serous fluid. I cannot but question this statement, because of the fact that it is not infrequently found near the apex of the root, even when there has been no apparent great pericementitis. It is sometimes entirely isolated from the gingivæ, and small nodules may be found upon teeth in which the gingival border of the alveolus is complete, with no opening to them from the cervical margins. This leads me to the conclusion that the deposit of these nodules is the initial lesion, so far as the tooth and its investing tissues go.

Another reason is that it does not usually commence when there is a considerable deposit of salivary calculus, which certainly would in-

duce such a gingival irritation as Dr. Black believes to be the cause of it, although salivary calculus is likely to succeed its ravages. My own impression is that it is due to some special stimulation of the pericemental membrane, and that it is analogous in its origin to that condition called excementosis or hypercementosis, except that the deposit from the membrane is not in any sense organized, nor indeed is it the result of anything like true functional activity. But be that as it may, the deposit is peculiarly irritating in its nature, and when the accretion is sufficient in volume it induces a breaking down of tissue, a resorption of the alveolar walls, with a destruction of the pericementum until the cervical margin is reached, and thus a pocket is formed extending from the gingivæ to the extreme limit of the deposit.

Dr. J. N. Farrar distinguishes this condition by the term *loculosis alveolaris*, and in a series of articles published in the *Independent Practitioner* for 1885 and 1886 he describes the symptoms very accurately. I cannot, however, agree with him when he says that the initiation of the lesion is at the gingival margin, or the annular lip of the gum. But his remarks concerning the general character of the disease may be studied with great profit.

The etiology, then, of this form of pyorrhea I believe to be in an abnormal condition, whether general or local, of the pericementum of a tooth, that induces the lodgment upon the root of a peculiarly irritating deposit, the sanguinary or serumal calculus, and the mere local irritation of this produces the subsequent changes.

The symptoms are, first soreness and perhaps elongation of the tooth, which are usually attributed to other causes, until the pocket is fully formed by the destruction of the pericementum and alveolar walls. The pocket becoming septic, and the deposits constantly increasing, there is a discharge of pus from it, with inflammation and turgidity of the gum, and pain of a sub-acute character that is more or less constant. Occasionally there is an exacerbation of all the symptoms, with the characteristic indications of a pus-gathering, which discharges and gives partial and temporary relief.

The pathology has already been briefly sketched. It consists in the breaking down of the tissues under the continued irritation of the deposits, with their constantly increased accumulation, and the spread of the diseased condition until the whole socket is destroyed and the tooth falls out, when, the irritating cause being removed, there is a cessation of the degeneration.

The treatment consists in the removal of the calculi as a first step. This is usually quite difficult, from the close adherence of the deposits, and their density and hardness. If very much of the socket shall have been destroyed, so that the tooth is very loose, this will be found impossible, and the removal of the organ becomes a necessity. The operation demands delicate and peculiarly shaped instruments. Both the pushing and pulling movements will be found necessary. Sometimes a specially shaped cylindrical or pyramidal bur may be used to advantage. If the deposits can all be removed, there will probably be little difficulty in effecting a permanent cure. But to do this will entail the necessity for several visits on the part of the patient. After each operation the pockets should be carefully washed out, and they may be treated with aromatic sulfuric acid, this to be

followed by a stimulating astringent. They should be douched with some antiseptic solution, such as mercuric chlorid, permanganate of potassium, or antiseptic pyrozone, and should be carefully kept aseptic until the pocket has healed up with a deposit of new bone. If there is reason to suppose any real caries of the alveolus, the edges of the affected bone should be burred out to the limits of the deposit.

During the course of this treatment, if the teeth are loose in their sockets, it is necessary to devise and insert some apparatus to hold them fast. It is folly to hope for any deposit of bone and reproduction of pericementum unless they are immovable, and much of the success of treatment will depend on this. I have usually been able to secure them by the use of ligatures crossed and woven between the teeth, and forming attachments to those which are sound. It is surprising what rigidity may be given to very loose teeth by a ligature ingeniously applied.

The prognosis depends upon the advance which the disease may have made before remedial measures were instituted.

CACHECTIC PYORRHEA.

The third condition is the most serious of all. I believe the first of those described in this paper to be due to a local degeneration; the second to a local irritant, depending upon some general disturbance. Both are exacerbated by the presence of micro-organisms. The third condition I believe to have its origin in some constitutional dyscrasia, for it can readily be traced from parent to child. There is little doubt that it is infectious, and it seems probable that there may be some specific organism to which it may be due. Possibly the belief that it depends upon heredity may in some instances have been obtained from the fact that the child is apt to become infected from the parent. It attacks people at an earlier age than either of the preceding conditions, and I have seen it with comparative frequency in children of ten or twelve years. The initial point I believe with Dr. Black to be in the peridental membrane. Indeed, the author named denominates it phagedenic pericementitis, thus indicating his idea of its origin. Dr. Witzel, of Germany, calls it infectious alveolitis. There is, as the primary lesion, an inflammation of the pericementum, producing an elongation and soreness of the tooth, and that, too, without any immediate threatening of loss of vitality. The other special symptoms, aside from the loosening of the tooth, are the characteristic red lines or blotches of pericementitis, with an irritable condition of the gingivæ and the discharge of pus from the sockets in the later stages. The pericementum dies in circumscribed locations, and the destruction of the alveolus follows through the consequent osteitis. Pockets may be formed about the tooth, but they will not be characteristic of the disease, as in the second condition described, nor will they be localized. The condition is not characterized by the formation of local deposits, as in the second condition, but the breaking down of the tissue is more general and the flow of pus more profuse. The whole of the pericementum of a tooth may seem affected, and the disease spreads from one tooth to another, until perhaps before the first one is entirely lost, every one, in the upper jaw especially, may have been attacked.

In the second condition, other teeth will probably be affected by the same cause that produced the first lesion, but there is no contagion. Successive teeth become diseased precisely as in hypercementosis,—through the general morbidity, and not because of any cachexia. But in this third condition there is a distinct spread of the disease from one tooth to another in the same mouth. Furthermore, dentists may carry the infection from one mouth to another, through unclean instruments.

To my apprehension, there is a distinct element of heredity in this condition, for it can readily be traced through two or three generations. It might be urged that, as it is admittedly infectious, there is a possibility that it may be communicated instead of inherited, but there are many instances in which the parents have died some time before the appearance of the condition in the children, thus precluding the possibility of direct infection. There seems to be a distinct diathesis connected with it. What this may be is not yet definitely determined.

The etiology, then, of this third state is probably constitutional, at least in the tendency to the affection. This may be aggravated by a lack of hygienic care, but even the most scrupulous attention to the teeth will not altogether prevent its recurrence. I have patients who are extremely fastidious in the care of their teeth, and in whose mouths I have determinedly fought the disease for years, only to see them return regularly with some new outbreak of it, when we had thought it entirely stamped out.

The pathological changes consist in a degeneration of the pericemental membrane, and its melting down and final entire destruction, with the consequent resorption and wasting of the alveolar walls of the socket of the tooth, the presence of micro-organisms, and the evolution of pus. There is also another change that often accompanies this state, and that is a loss of position of the teeth. They become distorted, are inclined to separate from each other, and to fall outside the line of the arch. There is a spreading of the alveolus by what would appear to be an interstitial growth, until two teeth may be so far apart that it would be possible to insert another between them. Especially are the incisors liable to this irregular divergence, and I have seen many instances in which beautifully arranged natural dentures lost all their regularity, and were made to present a very unsightly appearance. The condition is never that of contraction of the arch, but seems to be a thrusting forward of certain of the teeth, causing a protrusion, or an elongation, or a lateral divergence, sometimes to an extreme degree.

The symptomatology has already been sketched. It consists in a pericemental inflammation in the earlier stages, with all the usual indications of that condition, a distinct hyperemia of the surrounding tissues, loosening of the teeth, a discharge of pus more or less constant, with soreness and pain of a sub-acute character. Not infrequently there is considerable of pyogenic fever attending the suppuration, with a general malaise.

The prognosis is extremely unfavorable. Local remedies may retard the progress of the disease and subdue the acute symptoms, yet when relieved it is almost certain to return sooner or later, and even to hold it in check will require the most unremitting attention on the part of both patient and dentist.

The treatment consists in the use of mild cauterants to destroy degenerated tissue, antiseptics to overcome the septic condition, with local stimulants to promote the formation of new tissue when practicable.

I have thus as briefly as possible sketched the separate forms of the exhibition of this disease. But I would not have it understood that they are always distinct and separate in their pathology, or even their etiology. On the contrary, we frequently find the symptoms decidedly mixed, and the characteristics of the different states appearing in one individual case. Pockets may be formed, with deposits of serumal calculi, and at the same time the divergence and sprawling of the teeth which marks the third condition. When such is the case, the leaning of the tooth is always away from the pocket.

I have in more than one such instance witnessed an open space extending nearly to the apex of the root, which inclined away from the bare membraneless walls, these being plainly seen to a considerable depth, there being no special tumefaction of the gum-tissue to close up the space, and with but a limited amount of deposit, and in some instances without any signs of calculus whatever. Several such cases were presented at my clinics in the University of Buffalo during the past winter, and in at least two of them a free burring out of the affected alveolus to the bottom of the pocket, and its subsequent treatment with iodid and chlorid of zinc, resulted in a new growth, entirely filling the vacancy, but without any effect in restoring the tooth to its original upright position. Whether there was a new formation of the pericementum may be an open question, but in one of the cases there was every appearance of it, and in the other it was not improbable. Of course I did not dare to attempt the moving of the tooth back again by artificial means, being satisfied that this would eventuate in nothing but the breaking down of the newly formed osseous growth, and perhaps a worse state than that which originally existed.

I must leave the subject with you, in the hope that something definite may be brought out in the discussion which I trust may follow, and that new light may be thrown upon this much-vexed question. I can only say that there are many symptoms and pathological changes which time forbids me to consider, and that this presentation is, therefore, at the best but fragmentary.

A CASE OF DENTIGEROUS CYST.

BY DR. E. R. MULLETT, CLINTON, IOWA.

(Read before the Annual Meeting of the Eastern Iowa Dental Society, at Iowa City, Iowa, January 13, 1892.)

ABOUT the first of March, 1886, a girl, some thirteen years of age, came to me to learn the cause of a considerable swelling in the right upper jaw, in the region of the cuspid. It was plain that it was not an abscess: there was no great pain or soreness.

She had shed all of the deciduous teeth, except the right superior cuspid. A short time before her visit there had been a little swelling noticed, and her father had removed the deciduous lateral, which was loose; but the swelling continued, and had now attained such size as to be troublesome, though not painful.

I suspected that the permanent lateral and cuspid were in an abnormal position, and therefore had failed to erupt, and the swelling was in consequence, the jaw presenting the appearance shown by Fig. 1.

I saw that a surgical operation was necessary, and I hoped that at least one of the missing teeth might be brought into its proper position and saved; but I did not feel competent to perform such an operation, and advised that she go to Chicago, which she did. I went with her and her parents to Dr. T. W. Brophy. After he had examined the case, I suggested to him the desirability of saving one of the missing teeth, if they were found. He assented to this, and on the 31st of March, 1886, without an anesthetic, opened the cyst. The contents were a fluid, somewhat like blood, very dark and watery, but no pus. He found the lateral high up in the jaw, with its root bent backward, forming a well-defined hook; this tooth he removed. He explored the cavity for the cuspid, but failed to detect it, and dismissed the case. I had charge of the subsequent treatment, which consisted in daily syringing the cavity with carbolyzed water, then packing it with cotton, wet with the solution, and boracic acid freely sprinkled upon it. This treatment was given for some weeks by myself, and then continued by the child's mother. The cavity closed, the outer and inner plates of bone were re-formed and more nearly approximated each other, and a favorable termination seemed certain; but by the end of two years there was a growth, like a great wart, situated just above the temporary cuspid. This growth being troublesome because of its size, I removed it, cutting out a piece nearly half an inch in diameter, and extending into the original cyst an equal distance. This was removed just two years after the first operation, March 28, 1888. I had the tumor sectioned, and the microscope showed a papilloma, with a few spiculae of bone. It was pronounced benign.

Two years and nine months after the removal of the tumor, another had formed, larger and harder than before. I removed it on January 17, 1891, and tried to reach the seat or origin of it. I injected the tumor each time with a four per cent. solution of cocain, and removed it without much pain.

Of the last tumor I made both transverse and longitudinal sections, and studied them carefully with the microscope, and had them examined by competent microscopists. One, a professor of surgery in a medical college in Chicago, pointed out what he claimed were spindle-shaped cells of sarcoma, and said to me that I had a very serious case; that the tumor ought to be removed at once, with the utmost care and thoroughness. Others found no indications of sarcoma, and pronounced the tumor benign. One other, a professor of microscopy in a dental college, was almost sure he found *nested cells* of epithelioma.

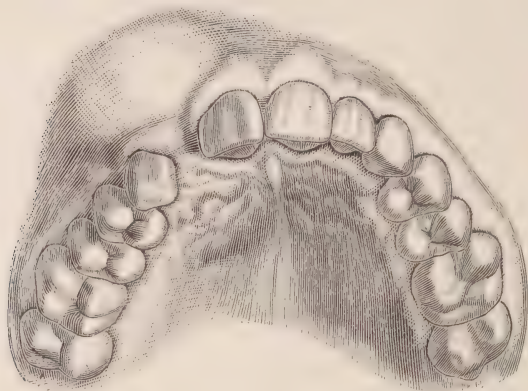
I concluded that the missing cuspid was the exciting cause of the trouble, and so told the parents of the patient soon after I had removed the tumor the second time, and that I feared the tumor would continue to grow so long as the tooth should remain. They said whatever I advised they would do; but they disliked so much to tell the daughter the unpleasant news that the case rested till the following summer, when they said they wished me to find some one to perform the operation.

In the latter part of August, 1891, I went to Chicago, and spent two days in the endeavor to find a surgeon who had had a similar

case. I interviewed several, and finally found one,—Dr. Ludwig Hektoln, who had had something to do with two cases very much like this one. I reported to the parents, and advised that they employ him, which they did.

On the afternoon of August 26, 1891, the operation was performed. The patient was placed on an operating-table, and chloroform admin-

FIG. 1.



istered. Dr. Hektoln was assisted by two others, and I watched the patient's pulse. The doctor began by cutting through the flesh about one-fourth of an inch above the festoons of the gums, and extending the cut from the place of the lateral backward one and one-quarter inches. He cut out first the fleshy part of the tumor, then separating

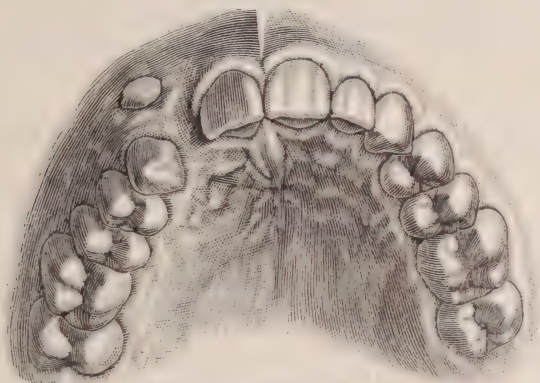
FIG. 2.



the soft tissues from the bone above the line of the cut, the flap was held away by one of the assistants, while the doctor, with chisels and mallet, cut away spongy bone, until he uncovered a cavity about the size and shape of a good-sized hazel-nut. The inner surface was quite smooth, and showed no indications of the presence of the cuspid.

After a very careful examination of the cavity, it was suggested that the bone be cut away farther back, in the hope of finding the tooth, and the doctor, after a few minutes more of cutting, uncovered part of the crown of the tooth, and shortly had removed it. It was in an upright position, and firmly imbedded in bone above the permanent bicuspid. It was not thought best to try to plant it where it belonged,

FIG. 3.



on account of possible complications with the tumor. The tooth is of normal shape and size, except the root, which is not quite so long as that of the average cuspid.

The cavity was carefully cleansed, and packed with sterilized lint, sprinkled freely with iodoform, and was not disturbed till two days after. Then the dressing was removed, the cavity syringed out with

FIG. 4.



a warm, weak solution of bichlorid of mercury, and again packed with lint dipped in the solution.

As before, I had charge of the subsequent treatment, which consisted of syringing the cavity with diluted listerine, and packing it with lint wet with the listerine and covered with boracic acid, lessening the size of the packing as the cavity became filled with granulations.

The recovery was quite rapid, and the indications now are that a cure will result. I saw the patient last week, and the parts are filled out quite to correspond with the opposite side of the face, allowance being made for the absence of the teeth. There is a small warty projection three-sixteenths of an inch in diameter, which is a little redder than natural; but I think it will give no further trouble, as I shall see it occasionally, and, if necessary, will touch it with nitrate of silver.

Figs. 1 to 4 represent models taken just before the corresponding operations, showing the shape of the jaw at the time.

(June 15, 1892. The indications of a cure are still favorable.)

TENTATIVE IDEAS AS TO THE CAUSES OF SUCCESS AND FAILURE OF FILLINGS.

BY HENRY GERHART, D.D.S., LEWISBURGH, PA.

(Read before the Susquehanna Dental Association, May 17, 1893.)

WHEN, a year ago, the title to a paper I was to read before this body was announced, some one exclaimed, "Whose dictionary do you use?" After having sent the secretary the title to this paper, I recalled this exclamation, and asked myself, "Are you certain that the opening word of your title means what you intend?" Turning to a standard English dictionary, and looking up the synonym of the word in three other languages, I found the consensus of definitions to warrant the use of the word, as implying that whatever ideas are entertained they are held open to change, upon evidence justifying conviction.

As to what constitutes success in tooth-filling, men may differ somewhat, and consequently it may be held to be a relative. The end to be attained may be, and indeed is, not the same in the minds of all operators.

It may be safely said, however, that originally, and in the great majority of instances to-day, the object of tooth-filling has been, and is, the saving of the non-decayed portion of the tooth by the arrestation of the progress of caries. It may with equal confidence be said, also, that with many operators, and more than equal frequency with the patients, the object of filling is to effect a so-called ornamentation of the mouth. In these cases, of course, success will depend upon the character of the esthetic taste of the patient and the operator. I must confess here that however transcendent was the skill of the man (now long gone to his rest) who did more than any one else to cultivate this taste, there comes to my mind the grave question, Was mankind on the whole benefited by his life?

Successful filling may then, in the ordinary sense, be said to be that sort of filling which will arrest the further progress of caries in and at the edges of the cavity to be filled, while at the same time the esthetic value of appearances is not ignored.

The query we must put to ourselves is, What conditions which the operator can bring about will effect this arrestation? I refer here to the conditions which are supposed to be under his control, for there are other conditions which are under the control, or perhaps, more correctly speaking, subject to the care or carelessness of the patient.

One condition which will secure the tooth against the recurrence of caries in the cavity filled is, that the filling shall be in actual contact with every portion of the walls of the cavity, and this without regard to the material with which the cavity may be filled.

I know very well that there are those who think with Dr. Flagg, that this is not a necessary condition, and also there are those who believe with him, that this condition will not always constitute one of security against the recurrence of caries.

If it be true that a leaky filling of gutta-percha will protect a cavity against further decay (and I do not now say that it will not), what becomes of the microbe theory in this case? It is true that the microbe theory (Dr. Miller to the contrary notwithstanding) is not booming as it was several years ago; that is to say, medical men of all specialties are being confronted by facts which make them doubt at least its universal application. Microbes or no microbes, let me ask, Why should not caries develop along the dentinal walls of leakage as well as along or between the enameled walls of a sulcus?

We may say, and it is probably true, that microbes can exert an influence only under environment favorable to them; that is to say, some constitutions can resist them. Let me give a single example: Four of my children have been simultaneously and repeatedly exposed to measles, scarlet fever, and typhoid fever; three of them have never been affected, while the fourth, the strongest and most vigorous, has been taken down by each of these affections. Now, if microbes or anything else can start caries *ab initio*, why not renew it under leaky fillings, under otherwise the same conditions? Those who say that a cavity with a filling in contact with its mural surfaces throughout has not secured immunity from a recurrence of decay, notwithstanding this contact, put it on the ground, I believe, that some materials are not compatible with tooth-tissue, and that salvation comes not by contact but through compatibility.

This is a point I cannot discuss, for the simple reason that I do not know anything about it; that is to say, I do not know any more about it than those who have such positive views on the subject.

To one proof of the value in conservation of contact over the entire mural surface each one of you can testify; that is, that in any denture on which you have operated, those cavities which have enjoyed the highest degree of immunity from return of caries are they in which you were most certain of placing the filling into contact with the entire dentinal surface.

I come now to another element conducive to the success of fillings, or, if you prefer, their permanency; and here I begin to feel some ground under my feet, for hitherto I have floundered through somewhat uncertain waters.

We fill teeth with other material, expecting later to replace with gold. Why? Because we expect to see a greater or less degree of transformation in the teeth as a result of their law of growth or development, which, in these organs, does not mean increase in volume, but increase in density, and a consequent increase in their power of resistance to whatever may cause caries. This increase of power to resist the onslaught of caries or its causes is indicated by the arrestation, frequently, of the progress of this disease without outside intervention. A potent factor, therefore, in the success of fillings is this

acquired power of resistance, and their being placed at or after this acquisition of density and consequent fighting power. The age at which this change takes place is very variable, being dependent, aside from heredity, on the habits and environments of the individual. Permit me to give two cases which are in a manner conjoint :

Thirty-three years ago, a farmer's son of eighteen years, who passed my office each day on his way to his college recitations, sought my services, saying that he had a tooth which he thought should be filled. On examination I found that it and another should be removed. After removing them, I placed for him nineteen mostly large gold fillings, including both sides of the six upper anterior teeth. Not long after he went into the army, serving three years of the war. Two years ago two of his fillings, one of gold and one of tin, had to be replaced ; the others are still intact.

At about the same time a molder's apprentice, of about the same age, came to me, and I filled for him about the same number and the same teeth, all with tin. He also entered the army, and now resides in the west. Last summer I saw him, and where his teeth had not been worn away the tin remained. To my mind there is no doubt but that the army diet and out-of-door life brought about the change in the tissue of the teeth of these young men which made my work a success.

We all have cases the sight of which sends our hope of success at once to zero, because the texture of the tooth-tissue is such as to make the teeth almost certainly unsalvable. On the other hand, the next may be a man with teeth so developed that we feel that any kind of filling shoved into them will prevent the recurrence of caries.

A few years ago, in conversation with Dr. Edwards, of Madrid, I said, " Do you not find that you fill teeth in that country with much greater hope of permanency than in America ? " " Oh, yes," he said, " the Spanish have much denser teeth than the people of this country."

This paper might be very much extended, but these two points will suggest to your minds much more for discussion.

THE MONEY AIM IN DENTISTRY.

BY DR. J. C. WALTON, HOWELL, MICH.

If we reduce to their lowest terms all the complex operations of modern production and effort, we see that each individual who takes part in this infinitely subdivided and intricate net-work of production and exchange is really doing what the primeval man did when he climbed the trees for fruit or followed the receding tide for shell-fish,—endeavoring to obtain from nature by the exertion of his powers the satisfaction of his desires. If, keeping this in mind, we look upon human activities as a whole as the co-operation of all embraced in any of its groups to satisfy the various desires of each, we plainly see that the reward each obtains for his exertions comes as truly and as directly from nature as the result of that exertion as did that of the first man.

The lawyer using his best effort to win the case for his client, the minister earning his salary by attending the spiritual necessities or expectations of his people, the dentist in his office relieving suffering or

preventing future distress by conscientious operations, are in effect, by virtue of a thousand exchanges, securing the staff of life on the wheat fields of Dakota, cutting sugar-cane in Louisiana, clipping wool on the plains of Wyoming, gathering cotton in Georgia, or plucking amid the green and gold of Florida orange-groves the fruit with which he breaks his morning fast. The fee we receive—what is it but a certificate to all the world that we have expended energy, labor of brain and body, and are entitled to the necessities and comforts of life? In this way we obey the divine decree that echoed in Eden upon our departing parents,—By the sweat of your brow shall you eat bread. In this way we prove the wise discernment of the framers of our immortal constitution;—all men are created equal.

Now, if the dentist is, like men in every other walk in life, obeying the divine decree, if money is the certificate of labor performed that insures one food, clothing, and a place of habitation, then the accumulation of wealth is but the storing of so much energy which, liberated at will, brings satisfaction of desires just as surely as the heat of the sun, stored for ages in the anthracite beds of Pennsylvania, yields you warmth and comfort on a winter day when liberated in your furnace. If, then, the accumulation of wealth insures you with the essentials of a healthy and happy life, if it strengthens the bonds of love by proving a barrier against want, if without it the promised land flies before us like the mirage, and all the dull, deadening pain, all the keen, maddening anguish that to mankind is involved in the words "hard times" may be our experience, what wonder that this little circular divinity called a dollar should receive the devotion due a heavenly king.

The scientist, the artist, the patriot, they say, must not count altogether or much on money; but I confess that to me financial success casts no stigma on professional conduct, and what good excuse there may be for deriding the dental ideal that is measured to any extent by its relation to a bank account, or why some one occasionally, and perhaps one whose credit is as low as his fame is high, should hurl fresh venom at this aim, stigmatizing it a "commercial aspect" or "lack of true professional inspiration," I fail to understand, when really nothing better elevates the profession than the fact that financial success is possible in it. Did anything ever give the great Atkinson more fame than his charge of seven thousand dollars for four days' services? Of course we feel that he outraged the eternal law of recompense, and this incident is only mentioned to illustrate how we measure our greatness more by the fees we command than by the professional piety we profess, and with which we try to indoctrinate others.

No one is more confident of his genius or more exultant over his success than the dentist who enjoys a competency. If we need to follow farther the defence of this manifestation of the principle of self-preservation, let us refer to the fact, observed so often, how any dentist, once secure in a lucrative practice, will defend that acquisition tooth and nail, with the ferocity of a hungry animal. Seventy-five per cent. of the reports to our societies for infringement of our code of ethics illustrate the working of this principle. The action is as praiseworthy as that of those great college infirmaries which, under promise to furnish charitably the poor with dentistry at cost of material, succeed in

clearing sixteen thousand per year or more. Surely it is time to declare to the world that the hope of reward is the mainspring of our action. Philanthropy hardly covers such motives.

These references are intended to show that there are reasons for the fact, and consequently the fact exists and need cause no alarm, that the worship of the power represented by money is shared by all alike, regardless of position. So universal is the desire for its possession that he who has no ambition along the line of financial success is likely to be viewed in pity, and he who has no known way of earning a living, and has not the capital in sight to explain his leisure, is set down as a person dangerous to the community, stamped with the name vagrant, and taken in charge by the proper authorities. Thus do we, through our officials, give expression to our convictions.

We may see that by the decree of that book which is venerated alike by Jew and Gentile, and by the decree of environment alike, the sweets of this world are to be extracted by the exercise of the powers we possess. This is but hinting at a possible excuse for the activity expected of every one. Our primary aim is the same as the agriculturist or the hunter,—to supply the necessities of life by personal effort. Now that we have a measure of our success by the well-known dollar, it is easy to see why a two-dollar fee is more desirable than a one-dollar fee, and we have at once a key to the power of money for the dentist. We have seen how by our actions we display our appreciation of this fact in a way we dare not declare in conventions or in print. We now pass on to inquire how well we succeed.

A casual statement of the financial responsibility of dentists anywhere may be found in Dun's or Bradstreet's commercial reports. By referring to Dun's for 1892, you will find the average rating of Detroit dentists is about four hundred dollars. Perhaps this may be considered a fair average for dentists everywhere. We can also state that only about one in ten of us are rated at all,—nine out of every ten being unknown in the financial world. Must we continue to be financially unknown?

Viewing dentistry as it appears in its present promise, it seems likely to increase in importance as an honorable profession, with increasing possibilities from a financial point of view. It is only beginning to touch the homes and lives of the people. Its horizon is surely expanding. Why not admit that in it lies one of the financial opportunities of the age? Why not speak boldly as we think and act? We are in an honorable avenue to independence. The hope of independence is in the heart of every young man entering. By all means support the hope and teach the way. This is urged because we are more likely to develop a real affection for the profession that yields sure and abundant returns, and because greater genius will be attracted into it by evidence of greater financial success. By all means encourage the training of those entering the profession to admire and love it and its institutions, and to participate heartily and intelligently in its triumphs. To assure them that their financial standing is of primary importance in building their professional, social, and domestic success is but to stimulate the God-given instinct of self-preservation and the hope of individual independence.

All readers of our journals know how many are on record as giving expression to a distinct protest against the doctrine that thrift is

one of the greatest virtues. They talk as though the practice of saving or accumulating was morally or ethically bad. Although there has been some hesitating applause to such teaching, the great undercurrent of popular approval is on the sensible side. Money-getting is rightfully the motive ; and I apprehend it would be perilous, if it were possible, to throw aside a motive which is founded on the accumulated experience of every age, of every line of activity, of every land.

The census shows the average amount of wealth per capita to be one thousand dollars, and we point with pride as a nation to this evidence of our prosperity. Our commercial rating is four hundred, on the average, for the profession. Now, if the possession of one thousand on the average makes the American citizen happy and the envy of the world, what bad effect could it have upon us to know that our average accumulation was per capita one thousand or more? If the possession of a competency makes life brighter, happier, or more hopeful, why discourage the aim to attain it? Can it be that the dental world is full of those who would rather miss the "Well done, good and faithful," of a well-protected hearth-stone than his club dinner or beer and cigars? Can it be that in our ranks more than the average number have a disinclination or inaptitude toward acquiring money? Do nine-tenths of us welcome the obliteration of commercial enthusiasm? All such will shudder at these sayings. My statements may be met by declaring this a time to talk of something else than dollars. But I insist that this is an age of dollars and ours is a business of dollars. We may, we should, we do, mix up with our dollars the noblest sentiments of fraternal devotion and love to humanity.

To accumulate a fund for miserly satisfaction is not advocated, but for the gratification and protection of those we love, and for self-protection when ambition is cooled and the frost of age is on the brow. For this let every dentist increase his energy to mountainous proportions ; for this let him apply his ingenuity of thought, tact, wisdom, economy. In financiering, as in dentistry, much suffering is needless ; much arises from misunderstanding, broken laws, and false ideas of propriety. Better dentistry and better professional rank will come with the better education our colleges are aiming at, also greater public confidence and individual trust. But the laws of financial success, how are we to be educated in them?

The vast majority of us—nine-tenths, in fact—who make up the bone and sinew of the profession are men who have their fortunes yet to make, who are rich only in skill, courage, and hope. No good purpose can be served by keeping them stranded on a financial desert. Colleges are hinting at endowments when we have nothing to endow with ; societies are suffering chronic invalidism because we are not able to support them generously ; and in the public mind we are classed as mere wage-earners because of the lack of accumulated capital to secure financial recognition.

It is not the purpose of this paper to discuss the relations between quackery and money, but probably in the discouragement of the money aim has been the hope of discouraging certain evil practices in the conduct of cheap institutions. We object, however, to such a remedy for this much-needed reform. Our teachers and association leaders should defend the money aim and teach the way to succeed,

because there would be less quackish methods practiced if legitimate methods were better known. Our journals should spread their ideas gladly, because increased prosperity means prompt payment for and increased consumption of the supplies they advertise, and we the laity would be as grateful for information of this kind as that concerning bacteria or bridge-work.

A high order of technical training and deep insight into principles such as are obtainable in so many colleges to-day, verified by experience, courage, self-reliance, clear perception, and business tact, means real capacity for success. By business tact is meant skill, carefulness, foresight, method, and all the little attentions that add to one's popularity. We can hardly hope that any will prove a genius in the field of finance, but every one should struggle with all his God-given ability to live up to the whole nature of his obligations to his family, the state, and his Creator. This cannot be done to-day without money.

Necessity is keener edged than the sword, hunger more powerful than the heaviest artillery, and pushed to its extreme limit shatters faith in religion, love for fellow-man, and eventually every refined, ennobling instinct of manhood. Want destroys spirituality and forces humanity to a condition where the brute takes the place of the man. Want is the fulcrum on which commercialism places its lever, and pressing down crushes professionalism out of existence; yet history has been quoted, patriarchs marshaled as witnesses, precedents cited, and even the moral sense appealed to in the hope of shattering the money aim.

The history of money-making is the history of civilization. There is dignity in accumulated wealth that commands respect the world over. Detroit has forty-two millionaires, but not a dentist appears on the list. In a country where success is marked by ability to manage millions the dentist without a home or accumulated wealth, like the dollar-a-day laborer, is compelled to work under conditions which deprive him too often of hope, of self-respect, of energy, of thrift. Give us, then, what instruction you can, that we may not remain a houseless, homeless, moneyless profession, forbidden to pluck the fruits of the earth.

We do not ask for that success which draggles the wings of genius and honor in the dust of vile traffic, but rather an attitude that permits the success of educated, commanding skill,—not simply technical skill with excavator and plugger, but general all-around skill that can honestly earn a dollar and with it the gratitude of the patient, that secures the dollar when earned and with it the respect of the people, that puts the dollar to the best possible use to insure the comfort of his dear ones now and hereafter. Love of professional dignity, stifled by hard surroundings, revives and warms at the contemplation of a well-furnished office and home comforts. The dulled eye accustomed only to cobweb frescoes and gutter-grimed carpets brightens at the prospect of new and pleasant surroundings. A glimpse of a higher plane arouses a desire to live upon it. Give every dentist to-day the technical and business skill to satisfy the instinct of self-preservation and home love, and you settle forever the question of ethics. The man who is comfortable, happy, and has made a fair provision for the future, has little excuse for a fraternal war.

Every year a crowd of young dentists appears on the field, better educated, more broadly trained, with wider outlook and loftier ambition than previous generations. May the hunger and thirst to rightfully obtain their just proportion of the new world's wealth be satisfied. May we learn that the best things in life are not those which come from any superior environment, but the things open to the striving, free as the air and light to every one who in the love of God and man, and the high self-respect becoming his citizenship, reaches forth to take the best Providence has reserved for him. It is this half-conscious sense of relief from a situation becoming intolerable, this growing realization of the opportunity of stepping out and up from a limited life of bigoted professionalism to a wider range through the boundless spaces of our new American life, that gives to our superior young dentists something of the wonderful magnetism of hope, the hearty enjoyment of opportunity, the splendid enthusiasm which fills all with amazement.

Judging from the manner in which the possible pleasures of professional life, the extremely good kind, are pictured by writers and speakers, one would imagine there were thousands engaged in dentistry for the rollicking pleasure of it, the exercise of philanthropic bent, or to relieve the stress of genius. Now, I doubt not there may be found here or there one who would remain in it after acquiring a competency, possibly for the love of it; but I am dealing with the rule and not the exception when I say that out of every thousand in the practice to-day, nine hundred and ninety-nine are there because of the fact that it is the most promising calling open that may lead to prosperity, and if the choice were given these same nine hundred and ninety-nine by some lucky fortune, every blessed one would leave it to-morrow. It's all very well to paint the satisfaction of a professional purity that is above a sordid aim a rosy-hued color,—to glorify it, some say. It sounds pretty, but it is not true. These words may disturb some of the varnish that has been applied to the mission of dentistry, but it is high time that a little truth be spoken to counteract the mass of rubbish and palaver that has been uttered and written.

There are possibilities in dentistry that are determined, like those of any other vocation, by ascertaining how far it can be made to pay. The dentist should exercise the same scrutiny and sagacity in the profitable employment of his time and funds as if he were an individual banker or manufacturer. Fees should be cast on a scale which permits a substantial margin of surplus after fulfilling all obligations. The yearly or monthly investment of profits in some form of recognized securities, to accumulate through the application of the principle of compound interest, then becomes possible. The conservative investment of enough funds to protect himself and family is a satisfaction that any dentist can appreciate. Wise management of office affairs, freed from antiquated precedent and dead tradition, ought to increase the aggregate wealth of the dentists in the United States by ten million dollars in one year. By the proper observance of recognized business rules, the exercise of real professional ability and the "doing to others as you would be done by" makes financial failure impossible.

The acquisition of capital is possible to all who care to obey the rules of success. Now is the time to prepare for the future, therefore make your arrangements, control your habits, regulate your manner

of living with the end in view of financial independence. With sobriety, with regular habits, and sweet, clean living a man may practice for years and live to see his happy children grow up to manhood about him. By adding economy, industry, and the practice of the golden rule, he may supply them with home comforts and an education; and by the addition of those qualifications for the development of which this article pleads, he may secure all these and acquire a competency that will insure him and the wife of his choice a golden sunset of peace and plenty to contented lives, and leave a legacy to encourage those left behind.

CORRESPONDENCE.

MIXTURE OF NITROUS OXID AND OXYGEN.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—The DENTAL COSMOS of this month has just been forwarded to me with the object of drawing my attention to Dr. H. C. Wood's paper, "On the Action of Nitrous Oxid, and of the Mixture of Nitrous Oxid and Oxygen." Dr. H. C. Wood is so well known in this country that we feel it our duty to carefully consider whatever he may have to say; and from correspondence which I have myself had with him upon the effects of nitrous oxid with oxygen, I, for one, am certain that he will give every possible consideration to facts which we may submit to him. The use of oxygen with nitrous oxid has occupied my attention for several years. I commenced working at the subject about eight or nine years ago. Up to the present time, I have administered nitrous oxid in the presence of oxygen to close upon two thousand patients. I am well aware that this number is a small one upon which to base any very definite statements, and I am willing to admit that in the first two or three hundred cases the results I obtained were not as satisfactory as could be desired. But I now hold such an extremely favorable opinion of the value of this method of administering nitrous oxid that I feel compelled to submit to your readers a few clinical facts which are not altogether in accordance with those which Dr. Wood has lately collected.

If those of your readers who are interested in the matter will do me the honor to refer to the *Lancet* (April 27, 1889, p. 832), they will find a preliminary notice of my earlier administrations, and a general *résumé* of what had been accomplished up to that time by other workers. They will see that I administered nitrous oxid with varying percentages of oxygen till I found a mixture which answered more satisfactorily than others. Of this particular mixture I carefully collected a sample over mercury, and Dr. Percy Frankland found that it contained 12.77 per cent. of oxygen. Twelve and a half per cent. happening to be exactly one-eighth of a hundred volumes, it was not difficult to devise a simple form of gasometer into which the gases could be introduced in the desired proportions. The anesthesia produced by this mixture was, in the great majority of cases, a remarkably satisfactory one. Instead of its being *less* profound, as one might at first sight imagine it might be, it was *more* profound than the usual

anesthesia of nitrous oxid alone. We can readily understand this when we reflect that the oxygen acts as a vehicle, so to speak, for the introduction into the lungs and blood of far larger quantities of the anesthetic gas than we could possibly introduce under ordinary circumstances.

Since the publication of the above-mentioned preliminary report, I have devised an apparatus by which the addition of oxygen to the nitrous oxid may be very conveniently effected during the administration. The apparatus was fully described in a paper which I read at the Odontological Society of Great Britain last year (see Transactions of the Society, June, 1892). This apparatus I now use very extensively. I go so far as to regard the administration of nitrous oxid free from oxygen as irrational and unscientific, at all events in most cases. I do not say that one can anesthetize every patient with nitrous oxid administered with that proportion of oxygen which is necessary to prevent *all* asphyxial manifestations. But in the majority of cases one can cut out, as it were, all obvious asphyxial symptoms without interfering with true and good anesthesia. In fact, a much better form of anesthesia is secured,—an anesthesia possessing most of the characters of deep chloroform anesthesia, but differing from the latter in that unpleasant after-effects are hardly ever observed. Dr. Wood's experiments lead him to the conclusion "that a mixture of nitrous oxid with oxygen does not seem to be available as a practical anesthetic." All I can say is that any one who has operated under nitrous oxid administered with oxygen would hardly care to go back to the older and at present time more usual plan of giving the gas free from oxygen. In nine cases out of ten one can secure the following condition: Absence of all blueness of the features; regular, softly snoring breathing; muscular relaxation; and an absence of conjunctival reflex. The cyanotic appearance of the patient is prevented, so that any friend of the patient who may happen to be present is not alarmed. The name "Schlafgas" has been given to this mixture by Hillischer, of Vienna, in consequence of the sleep-like condition it produces. The snorting, jerky, and irregular breathing of ordinary nitrous-oxid narcosis is absent. The jerky muscular movements, which, more especially in children, sometimes render a dental operation difficult of performance, are completely abrogated. In addition to all these advantages, the use of oxygen with nitrous oxid robs the latter of what is probably its only danger,—viz. its asphyxiating properties. A careful investigation of the few fatalities which have taken place under nitrous oxid would probably lead to the fact that asphyxia was the real cause of death in each case. Nitrous oxid *per se* causes obstructed respiration when pushed to an unnecessary degree. But in the presence of oxygen all such obstruction vanishes. I have never seen the slightest approach to danger.

I hope Dr. Wood will understand that the above description applies to what we may call typical cases. There are some patients who are best anesthetized either with nitrous oxid *per se* or with nitrous oxid mixed with so little oxygen that certain of the usual phenomena of nitrous-oxid anesthesia are produced. These, however, are exceptional. By the use of the apparatus to which I have referred, the administrator may regulate the ingress of oxygen as occasion may require, and may bring every case to a successful termination. The

method is principally of use in children, in very old persons, in anemic subjects, and in persons who are so susceptible to nitrous oxid as ordinarily given that they remain a very short time under its influence. The resulting anesthesia after nitrous oxid when administered with oxygen is distinctly longer than that after nitrous oxid alone,—a point of no small importance to the dental surgeons.

It is only fair to add to the above remarks that there is one very slight disadvantage attached to the method,—viz, that the administration is more difficult to conduct than the administration of nitrous oxid alone. But the additional trouble is more than compensated for by the results. Indeed, if any of your readers would but devote a short time to the matter, and become proficient in the administration of the two gases, he would certainly never return to the older method of producing anesthesia.

In conclusion, may I ask Dr. Wood to reconsider his conclusions and to test the effects of nitrous oxid with oxygen upon human beings? To any one less cognizant with the possible sources of error in work of this kind, I should venture to point out the necessity of administering the two gases absolutely free from the slightest traces of air. In many of the ordinary forms of apparatus the valves are inefficient, the channels through which the patient breathes are too narrow, and the face-piece is of such a shape that it does not fit with absolute accuracy. But granting that nitrous oxid and oxygen are given together in proper proportions by a properly constructed apparatus, the effects produced will be found to be remarkably satisfactory, more especially for dental operations.

I am, sir, your obedient servant,

FREDERIC HEWITT.

10 GEORGE ST., HANOVER SQUARE,
LONDON, W., May 31, 1893.

DR. MILLER'S THEORY OF DENTAL CARIES.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—It has been a question with me whether the remarks of Dr. Allan, at the December, 1892, meeting of the Second District Dental Society of the State of New York, as reported in the DENTAL COSMOS for February, p. 136, are entitled to any consideration, as they were distinguished by anything but their applicability to the subject. He said I had read a ridiculous paper, condemning the theory of decay of the teeth by Dr. Miller; he says he didn't know I was a biologist, etc. Well, there is nothing in his speech to indicate his ability to judge; and unable to discuss the question on its merits, he devotes himself to slurring.

The paper that seemed to offend Dr. Allan was published in the *Microscope* of June, 1889, and in the DENTAL COSMOS of October, 1889. No one has taken the trouble to show wherein I was in error, although the fifty reprints furnished to me by the *Microscope* were carefully distributed among those who were known to be favorable to Miller's views. I cannot now think that it was from a lack of a disposition to do so, since reading the report of the recent meeting in New York.

The readers of the COSMOS will notice that there were no specifi-

cations to the charge made by Dr. Allan in reference to my paper. I challenge him to make them. I claim that in every particular I was correct, and that Dr. Miller's paper that I criticised was the most inaccurate article I ever knew to be published in the name of science. It will be found in the DENTAL COSMOS of January, 1883. The only thing I feel I should be censured for is that I reserved my criticism so long.

He stated that he had immersed a freshly extracted tooth in concentrated carbohic acid, and afterward found its carious portion quivering with living organisms. He seemed not to know that when immersed in a liquid there was a movement of finely divided particles, known as the "Brownian movement" to people familiar with the microscope.

He thought he had discovered starch in his bacteria, on account of a blue tint produced by treating his preparation with sulfuric acid and iodine. He did not know that vegetable amyloid was affected the same as starch by iodine, and that he had changed the cellulose of his fungi into that substance by the use of sulfuric acid. Neither did he seem to know that the class of plants to which bacteria belong were not starch-producing plants; that the very nature of their method of obtaining subsistence made it unnecessary and impossible. Starch is produced from the elements of water and carbon, the carbon being taken from the carbonic acid of the atmosphere, and the presence of the sunlight and of chlorophyll in the plant is required in order that the chemical changes necessary for the production of starch may occur. The class of plants which manufacture starch may subsist upon water, ammonia, and carbonic acid, inorganic elements, raising these to the condition of organic. Now, bacteria subsist upon decomposing organic matter, and the process of nutrition may go on in the dark as well as in the light.

Dr. Miller seemed not to be acquainted with any of these facts. He also claimed to have seen (in his mind's eye) bacteria boring directly into sound dentine, generating acid at the growing end. This statement I considered thoroughly ridiculous.

Dr. Miller claims, in his book ("Micro-Organisms of the Human Mouth," page 180), that he was correct in every respect, but on page 346 he seems inclined to give it up, and calls upon Galippe to share the responsibility (foot of page 345).

His entire paper was made up of just such material, and yet there is not the slightest doubt but Dr. Allan took in every word of it as the result of the most painstaking investigation.

Dr. Allan finds fault with me because I prepared ground sections of teeth for the market, and says many of them were misleading. He fails to say wherein. The idea of the ground section of a tooth misleading any one! The very remark "gives him away."

There was a demand for my preparations, and I found it profitable. But if Allan has any of them, and thinks they have deceived him, he may send them back.

He quotes an old saw about "rushing into print." Apparently unable to see anything but impure motives in my published statements, yet from the character of his criticism, I feel that I may well question his, and suggest that his remarks would have had greater value if he had confined himself to his subject.

F. O. JACOBS.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

THE forty-fourth annual meeting of the American Medical Association was held in Milwaukee, Wis., Tuesday, Wednesday, Thursday, and Friday, June 6, 7, 8, and 9, 1893.

We present the following abstracts of the papers read before the Section of Oral and Dental Surgery, with a report of the discussions on the same.

WEDNESDAY, JUNE 7.

In his annual address, the chairman, Dr. A. E. Baldwin, of Chicago, in speaking of the effort which the association was making toward revision of the code of ethics, said that the nearer we get to the true ideal of professional gentlemen in our very natures the less need we will have for a written code of ethics, and he thought it was frequently the case that the very ones who were most likely to insist upon the letter of the code were the ones most likely to violate the spirit.

The chairman also referred to the tendency of the medical profession to what he called faddism, and to the recent, if not present, fad of ascribing the cause of every disease to the effect of micro-organisms.

In closing, he referred to the loss that the section had suffered by the death of Dr. W. W. Allport.

On motion of Dr. Edgar Palmer, a committee was appointed to draft a resolution of regret for the death of Dr. Allport.

Dr. Edgar Palmer read a paper entitled "Systemic Medication in Dental Practice." Following is an abstract :

SYSTEMIC MEDICATION IN DENTAL PRACTICE.

Let us consider, first, our specialty in its physiological and pathological aspect.

It is supposed that all who are associated with this section are of the opinion that "dentistry is a specialty of medicine."

It is sufficient for me to base my remarks upon the simple fact that an all-wise Creator has given man organs of mastication much after the same manner and for an equally important service as the organs of hearing and sight ; and being subject to abuse, disease, and functional derangements, thousands of persons are required to devote their lives to their care and treatment. I am aware it is asserted that this great army of scientific men are, by the mechanical character of their methods, too far removed from the province of general medicine to be entitled to the privileges accorded the oculist or aurist in giving attention to functional disturbances remote from organs over which they have special charge. I confess that my eyes are too weak to see the distinction, and my ears too dull to hear the voice of duty calling louder in one case than another. All the ambition and desire of the last years of my school life were centered upon the one thought of some day entering upon the practice of general medicine and surgery. An empty purse obliged me to take up something else, and

as a temporary expedient I took my place at the foot of the ladder upon which the dental profession was then but slowly climbing toward the distinguished eminence which it now occupies in the department of science, literature, and art.

The status of dentistry to-day is most gratifying. For many years every force and pressure of intellectual progressive effort has been brought to bear upon the creation of a higher standard of qualification; and while we have done much, there is opportunity to do more to exalt and commend our services in this general and beneficent cause of humanity.

I can confidently say that now, after more than thirty years' constant practice of this specialty, I am as near the practice of general medicine as I ever expect to be. This branch of the healing art, with its achievements, is good enough for me, and its resources and beneficent possibilities stimulating enough for any purpose save avarice and greed. The words of Daniel Webster in relation to the practice of law are so germane to this thought that I quote them here:

"Our profession is good if practiced in the spirit of it; it is damnable fraud and iniquity when its true spirit is supplied by a spirit of mischief-making and money-getting. The love of fame is extinguished, every ardent wish for knowledge repressed, conscience put in jeopardy, and the best feelings of the heart indurated by the mean, money-catching, abominable practices which cover with disgrace some of the modern practitioners of law."

The application of the established principles of general medicine was a matter but little considered in the first years of my practice. I frankly say it is comparatively but little understood by me to-day. This much we do know, however,—that it is the province of the dentist to search for bodily manifestations in health and disease which may bear upon the interpretation of dental function. We do not deal with the human teeth as though they were a mere mechanism of bone and pulp and nerve, or deal with their functions as an independent agent, with little or no concern or relation to other organs and the whole life of the being, but recognize a vital harmony and essential interdependence,—the orderly subordination and co-ordination of parts each dependent upon the other for functional activity.

The magnetic influence and electric force of all nerve-supply, and the effects of fully charged, abundant blood-courses, bring to our aid a health-giving action upon which we can build pledges of success, while on the other hand lacking in vitality a system with evidences of derangements in formidable disturbances, neurasthenic in character, we are safe in predicting an aggravation if not the direct source of dental lesions.

The only conspicuous inheritance three-fourths of the human race confer upon their offspring is a stunted development and impaired structural formation of the different organs that so universally beget disease.

Temperament and disposition are not more certainly marked upon the child than the impoverished condition of all nerve- and blood-supply, from defective nutrition and assimilation; and as such conditions in the child are rarely obliterated during life, they should not be neglected in our practice for physiological, pathological, and diagnostic purposes at any time.

The organic origin of pathological processes influencing local lesions has for many years impressed itself upon my mind as a subject worthy of our earnest consideration. As long ago as 1878 I was permitted to read a paper before the American Dental Association upon this subject. What I intended to embody in my effort was this,—that the hyperemic condition consequent upon the saturation of the tissues of the body with alcohol so strangled the vascular and nerve supply as to cut off proper nourishment from the dental membranes, and indirectly establishing a retrograde metamorphosis of the nerve-fibrils of the tooth, prolific also of neuralgia and often attended by wasting of tissue, as in decay, under such circumstances of impaired nutrition.

The mysterious force which inhibits itself in the sensitive protoplasm of a muscle is a phenomenon of no less interest to us than to the general practitioner.

The scientific investigations carried on by dentists during the last decade to put this profession, as well as medical men, in possession of agents which lessen the vital activity of pathogenic parasites, is evidence of an intellectual and progressive spirit most commendable, as well as interesting and valuable to all practitioners of the healing art.

Why, then, let me ask, in view of all that our profession has achieved in this line of scientific work, and in view of our rigid system of dental education in all branches which general medicine requires of other specialists, are we prohibited from exercising this knowledge we are expected to possess in the treatment of such systemic conditions as directly influence a dental lesion?

Brought daily face to face with all these exciting and retarding influences which you so well understand, must we forever lock the door leading out of the oral vestibule into the wonderful habitation of man's vital forces and turn the key over to the family physician?

How many dentists out of two hundred in this country of whom I recently asked the question do you suppose answered that they prescribed constitutional treatment independent of the counsel or advice of the physician? The number is too few to stimulate me in carrying on the investigation any further.

But, notwithstanding that the majority of our profession, men whose views are worthy of the highest regard, express themselves adverse to the practice of administering medicines themselves, I believe the day will come when it shall be considered within the province of the medically educated dentist to make recommendations for general physical ailments affecting the organs given into his care. Of course there must always be a courteous recognition of the rights and duties of the physician, but *within a common-sense limit* I believe "It is better to experience the truth and enjoy its practical uses even without a perfect knowledge of every theory, than to have full mastery of the theory but reap no benefits from it."

Discussion.

Dr. J. Taft said that it was in the experience of every practitioner of dentistry to have the question raised about the need of systemic medication as a necessary part of the treatment of the diseases of the mouth and teeth. He could see no reason why a dentist should not

modify by treatment the systemic conditions which hindered the success of his operations in the special line of the profession which he practiced. Why should he not treat the system, as well as the oculist or any other specialist who found the patient in an unfit condition for treatment for the diseases which their specialties would cover? The only reason this question should ever come up in regard to the dentist is because, unfortunately, he is not usually willing or able to diagnose or prescribe for physical conditions outside of the oral cavity. The ophthalmologist, the aurist, and every other specialist, having laid the foundation of their professional skill in the studies of general medicine, and turned their attention afterward to the specialty chosen, are fitted to, and unhesitatingly do, prescribe when necessary to change the conditions of the system, so as to favor the success of the contemplated operation. It is just as important that the dentist should be able to do this as any other specialist. The diseases of the teeth are influenced by the diseased conditions of the other organs, and it is patent to every intelligent operator that his success in dealing with the teeth and mouth, the diseases of the alveolus, mucous membrane, and antral cavities, will depend largely upon whether he can place the general system in the condition which will favor his success. Until there is a toning up and strengthening of the general system, it is often worse than useless for a dentist to operate.

This, however, is not all. There are signs of diseases which come under the dentist's eye more serious than merely a run-down system, and he should be able to recognize such peculiar conditions in a degree, and at least understand the relationship between such conditions and the disease in his peculiar domain, even if he prefer to refer the case to a regular practitioner or a specialist in some other branch. The dentist should be able to refer the patient to the physician, giving a fair diagnosis of the case. If a physician received a patient from a dentist with only the message, "Something is the matter; find out what it is, and bring about a better state," he would not have a very high opinion of that dentist's standing as a specialist in medicine.

All our medical teaching is based upon the idea that for every specialist a general knowledge of the whole system of medicine is necessary.

If it is not necessary for the dentist, why should he study anatomy and physiology? If it is not necessary, why should he study general pathology? It is necessary, for if he does his whole duty in his profession, he must need this learning to enable him to recognize and treat such general conditions. And more than that, it is necessary for the treatment of such diseased conditions as are recognized as belonging to his own specialty. The course of an abscess on the gums or necrosis of the jaw is the same as abscess on any other of the soft tissues and necrosis of any other bone.

Dr. John S. Marshall said that when a dentist did not feel able to treat systemically when it was necessary, it was the fault of our former faulty system of teaching in the dental schools. Until recently it was generally considered that a dentist had no need of the knowledge of general medicine. No one would go with a diseased eye to one who was not a graduate of medicine, and the feeling about dentists should

be as it is about oculists. The dentist should be as able to treat general disease as any other specialist. He should be sorry if he could not prescribe for any condition which would hinder the success of the treatment for which the patient had come to him. Our field is the mouth, not the teeth. We must be able to treat systemic conditions of which we observe indications, and if we are properly educated so as to be able to diagnose them, why should we not?

Dr. Vida A. Latham said she would like to ask the section a question bearing on the subject of the paper, and also upon professional ethics or etiquette. The question is, May a dentist suggest to a physician the necessity for a general line of treatment for disease of the general system? Dr. Latham related the case of a patient of hers, a young man about seventeen years of age, who was a hard student. His teeth had been sound and apparently good until he had an acute attack of pneumonia, when it was found that in the course of about four months, either by cause of the disease or of the treatment, cavities had appeared in nearly every tooth. When examination was made, the young man was so weak that he fainted in the office. Dr. Latham called the attention of his mother to the state of his teeth, as well as to his physical condition, and recommended that he be put in charge of his physician, as she thought there was serious danger of a relapse into pneumonia. The physician declared that he was in need of no further treatment. The consequence was, as she had foreseen, a dangerous relapse, which leaves him at present with a second severe attack of pneumonia. Dr. Latham desired the opinion of the members of the section as to whether she had done more or less than she should in sending the patient back to the physician for treatment.

Dr. E. S. Talbot said that the whole question of the relations of the dentist to systemic medication and to the general practitioner was affected by the faulty system of dental education, which is entirely wrong. He spoke of a gentleman who held a position in a medical college and also in a dental college. The faculty of the medical college were pleased with him, but after the first year the faculty of the dental college declared that his lectures were too far advanced for the dental students; that they did not care to go so deep into things, and they were dissatisfied with him on that account.

The condition and the ambition of the dental student of to-day is little better and little higher than it was twenty-five years ago. He only cares, in most cases, for just enough general medical and physiological knowledge to get for him the diploma, and when he has secured that he forgets all that is not, in his opinion, necessary for his success as a dentist.

The specialists in other departments do not feel so. They generally have practiced a few years at least before taking up a specialty, and are competent to treat any diseased condition which presents itself to them. The dentist, on the other hand, could not diagnose nor treat diseases of the general system, and not being a graduate in medicine would not dare to treat them. For himself, he said that his education was all the wrong end front, as he had practiced before attending any college; he then took the two-years' course in a dental college, and afterward had taken a medical degree. The proper course would be the exact reverse of this. First the medical degree,

next the dental, and afterwards the practice. There are comparatively few of his patients that he does not prescribe systemically for.

He had no sort of hesitation in considering himself a part and parcel of the medical profession, and in such a case as Dr. Latham reports he would go to the family physician and point out to him the condition of the young man and his need of treatment. He often has cases where he sees conditions which make it necessary to send the patient to a physician.

Dr. Edgar Palmer said that he thought where a patient came to a dentist in such physical condition as to make it impossible for the dental work needed to be done, the dentist should prescribe what will alleviate the condition. There is a long list of troubles we do prescribe for, and which we should prescribe for, in preparing the system for the surgical operations in the mouth; but of course there is a common-sense limit, and we should not take upon ourselves the responsibilities of the general practitioner.

Dr. John S. Marshall said Dr. Latham's question had not been fully answered yet. It was, Had she the right to go to the physician and tell what she had discovered? He thought she not only had the right, but that it was a duty.

Dr. George V. I. Brown agreed with the ideas which had been advanced, but thought that the education of dentists is improving, and rapidly, too. The dentist should know how to prescribe, but should be careful not to encroach on the field of the general practitioner, and so raise feelings of jealousy. More trouble comes to the physician's patients from not consulting the dentist than comes to the dentist's patients from not consulting the physician. If he had a patient who was not getting from his physician proper treatment, he would not hesitate to recommend a change of physicians. This of course would rarely be necessary, but sometimes it would.

Dr. Anderson said he saw no reason why the dentist should not apply all the knowledge he had in any direction for the benefit of his patients. If, however, the dentist neglects his own specialty to learn to practice general medicine, he would lose opportunities for advancement in his own special line.

Dr. W. H. Carson said that to discuss the question asked by Dr. Latham was equivalent to admitting that we were not specialists in medicine. If we are members of the medical profession, then of course we should consult with the family physician. Unfortunately, the majority of the dentists are not properly educated; they are not competent even to write a prescription. This should be changed; we should be physicians first and specialists afterward. Dentistry is looked upon by students as a more easily acquired profession than medicine, and those who are unable to acquire the latter feel that the former is within their reach, and thus it comes that the class of students at dental colleges are less highly prepared, educationally, and probably mentally, too. This should be changed; as much should be required of the dental student in the way of study as of the medical student, and the requirements for matriculation to the dental student should be as high.

Dr. Taft regretted that the mass of the profession did not appreciate the necessity of a good general education as a foundation for the professional education. The low standard of education required for

entering the colleges is not so much the fault of these institutions as it is the fault of the profession. Almost every student is sent to the college either directly from the office of a preceptor, or at least has taken the advice of some dentist as to the step. This is where our responsibility is. If an unfit man asks your advice about studying dentistry, persuade him not to study it.

Most of the dentists have very little knowledge of general medicine, yet if they would they could get this knowledge; and they should take hold and master it, and they would do so if they could appreciate the necessity of it. On the other hand, the medical profession do not appreciate the diseases of the mouth. This is because they have so many things in their course of study that the diseases of the special organs are not taught thoroughly in the colleges.

On motion, the discussion was closed.

Dr. A. M. Benson read the following paper, entitled

THE ENEMIES OF THE HUMAN TEETH.

In the same mail with Dr. Talbot's letter of invitation to prepare a paper for this meeting, came a circular from a member of our profession announcing that he had discovered a new local anesthetic, making the extraction of teeth harmless and painless, the greater part of it being devoted to testimonials from doctors and dentists who had used it, and telling how they had removed from six to twenty teeth from the mouth of one person at a time, thereby very much increasing their business; the author closing with urgent advice to all dentists to avail themselves of this great boon, offered to the profession at the very low price of one dollar a bottle, or six for five dollars. During the past year I have received perhaps half a dozen similar advertisements, and nearly all of them signed by a D.D.S. Many of you have had, no doubt, a like experience.

Chagrined at this impudence and unprofessional proceeding, and believing that such practice ought not to go uncondemned and under professional protection, I have accepted the invitation, choosing for my subject, "Enemies of the Human Teeth;" and the enemies to which I wish to direct your attention are not those about which so much has been written, and which it takes a scientist with a microscope to discover, and against whom the evidence is mostly circumstantial, but those conspicuous and more dangerous ones whom we have all seen with the naked eye,—who plume themselves with professional titles and dwell mostly in "dental parlors," though they are sometimes found in the country doctor's office,—who shed innocent blood and mutilate the human body in the guise of saviors, and claim special social recognition and honor,—who write articles for the journals and are often found in college faculties, where they are conspicuous for their zeal in elevating the standard of the profession,—whose interesting portraits often confront us in the advertising columns of the public press, along with other medicine humbugs.

Perhaps some one murmurs, This is a slander.

Let me relate what I witnessed in one of the high-grade schools:

A local dentist, not a member of the faculty, was invited to give a clinic for the benefit of the class, the operation to be the extracting

of a number of teeth under an anesthetic, ether being the one administered. The victim, an ignorant servant girl, whose mouth was indeed in great need of renovation, affording the students—most of them youths who, like myself, had but recently dropped fork and hoe handles to go through college and be doctors—a splendid opportunity to take a lesson in the highest achievement of the dentist, “the restoration to usefulness of diseased teeth.” But what was done under the direction of the professor? The frightened girl was placed in the chair, pulled into the recumbent position, and the inhaler placed over her face, against all of which she frantically struggled, but the odds being against her, she finally succumbed. Then began a scene worthy of a place in the Spanish Inquisition, and which properly described and illustrated would form a fitting canto in Dante’s “Inferno.” The chief operator, after removing his coat and cuffs, seized a pair of forceps, and with trembling hand thrust it into the spongy gums as near a tooth and collection of tartar as his shaky condition would permit. Successive quick jerks, accompanied by the sounds of crushing bones and low groans, followed by a swaying among the pressing crowd, continued for some time, when, owing to exhaustion of the operator or the overflowing of blood and ingesta which threatened to strangle to death the patient, active operations were for a moment suspended; but there still remaining some roots deep in the gaping wounds of her jaws, others present, knowing themselves experts, volunteered to kindly assist the tired scientist and cover themselves with blood and glory. The former was easily accomplished, but the opportunities for glory seemed wanting, and after bringing away a few chunks of gum and process, they retired, declaring those were the most obstinate roots they had ever encountered. The patient having again collapsed, a sympathetic looker-on, realizing if this poor creature should any longer serve the ends of science she must die, suggested that the clinic cease for the present, and the remaining roots be removed at a future time, when the gums were not so swollen. The hours, too, now having passed, the class, evidently satisfied that their *alma mater* had provided them a fine clinic, hurried away to the amphitheater to listen to a lecture on remote disorders in the body caused by carious teeth, leaving the patient to the care of the janitors, who, considering her from the human rather than the scientific standpoint, kindly cared for her until she was somewhat restored, and some hours later conducted her, though still dazed and bleeding, out from this woeful place.

I have never been able to conceive of any excuse for such an outrage within a dental college. As evidence that such teaching bears abundant fruit in practice, I quote verbatim articles from a popular dental journal, the first headed “A Large Tooth”:

“About a month ago a lady from our town introduced herself to me with the intention of having some teeth extracted to make room for an artificial set. I removed eight of them with great difficulty, though I had administered first a soothing preparation invented by me for this purpose. A few days ago the lady returned to have the remaining teeth removed. In examining the mouth, I found a perfectly sound upper cuspid on the right side, and I advised her to let it remain. The lady, however, insisted on having it removed, in doing which I succeeded, after two unsuccessful attempts, with

safety forceps. The tooth is one and one-eighth inches long, and shows a circumference of one inch. The lady weighs at the present time one hundred and ten pounds. Has any one extracted a larger tooth? We should like to compare notes."

In the next issue appeared the following answers:

"About five years ago I was practicing in the town of ——. One day a cadaverous-looking man came into my office to have several teeth extracted. After removing two or three, I tackled the right upper cuspid, and after some little difficulty it gave way. I thought I had pulled the whole jaw off, for a large piece of process and the first bicuspid came with it. This bicuspid is one and seven-sixteenths inches long, and one and one-sixteenth inches in circumference."

"Last June I extracted seven superior teeth for a lady. I found four very difficult to remove,—viz, two canines and two first bicuspid. One canine is one and five-sixteenths inches long, and fifteen-sixteenths of an inch in circumference. The bicuspid is bayonet-shaped. One is one and one-sixteenth inches long, and one inch in circumference. The lady weighs about one hundred and twenty pounds."

"About three weeks ago I extracted six teeth for a lady, among which were two upper cuspids, both largely decayed. The larger of the two measures one inch and five-sixteenths in length, and almost one inch in circumference. The smaller is one and a quarter inches long by fifteen-sixteenths of an inch in circumference. I preserved these monsters, and have them in my possession."

I avoid names, as my desire is not to point out individual shortcomings, but to direct attention to a too common practice. I believe the venerable Dr. Holmes is credited with saying that if all the drugs used as medicine had been sunk in the bottom of the sea, it would have been better for humanity in general. I think the same might be said, if not of the entire dental profession up to date, at least of all the instruments invented for the extraction of teeth.

I venture the statement that at the present time, though in the vanguard of the profession are many noble men who can truly be called dental doctors, a large number of so-called dentists are truly "enemies of the human teeth," destroying more than they save.

I knew a dentist, now deceased, of whom it is safe to say that the number of teeth he extracted during the twenty-five years he was in practice would fill an old-fashioned farm cart. Imagine for a moment what this represents in blood, tears, and trepidation, to say nothing of the leering deformity, crippled condition, and many deaths directly due to this malpractice. The best men in the profession are agreed that ninety-nine out of one hundred of all the teeth and roots presented for treatment can be saved and made comparatively useful, and with less pain to the patient. It has also been demonstrated by implantation—though I hope this operation will not become popular—that teeth long out of the mouth and strangers to the new organism can be accepted and become firmly held in the jaw; then how much better must it be to retain roots which have the advantage of natural position and long-established attachment. This being true, what shall we say of those who extract sound teeth to make room for an artificial set, or because some people ignorantly desire it?

As mentioned in the beginning of my paper, this has all been said before, and the majority of dentists have a vague idea that it is wrong. Then why is it? I think the chief reason may be given in one word—"Business."

O business! what crimes are committed in thy name!

The public has so long been educated by the quack in all the departments of life, that it is easy for men without moral character, but possessed of some cunning, to get money by preying upon them. Every day thousands of people freely give hard-earned money to have teeth extracted which should be saved, and thousands of dentists daily serve them, conscious of the wrong, simply because they want the money. Alas, that cash should be so dear and flesh and blood so cheap!

A dealer in dental materials informed me that one manufactory of artificial teeth sent out five million sets each year, and there are a number of such enterprises in our country whose prosperity depends mostly upon the efforts of those dentists who extract teeth to make room for their products. But this weakness for money does not belong to the dental specialty alone. If from all the learned professions were taken those who practice for revenue only, the number in each would probably be very much diminished.

Theoretically this is an age of high ideals, but practically we have something yet to reach; and though I have called attention to evils common in our profession, and am convinced that for many of us it were well to examine ourselves if we are worthy the title we bear, yet I believe that our specialty has made greater progress than any other department of the medical science, having accomplished the successful treatment of nearly all the diseases of the mouth, and making the preservation of teeth in the hands of the intelligent and conscientious dentist a certainty. In my opinion, what is needed is not so much higher knowledge, but a better use of that already possessed.

While at college I was often edified with encouraging lectures by members of the faculty, who never failed to inform us that there was plenty of room at the top of the ladder, seldom mentioning that there was anything needful or honorable to do at the bottom. This may be well, but I have discovered in practice that if the glory of the dentist be the salvation of the natural teeth, for the dentist true to the noblest impulses of his nature who values the approval of his own better judgment above all things, and will succeed by honorable means or else retire, there is an extensive field for labor at the bottom of our professional ladder. Probably less than one-fourth of our population take proper care of their teeth.

I have thought that if we had different degrees or orders in our specialty, as in the clerical profession, so that the ambitious youth who now seeks admission to the college, but owing to its high requirements fails to enter, for such there might be a sort of preparatory department where, if bringing evidence of having learned their catechism (especially our duty to our neighbor), they might be admitted and instructed in that branch of our work which does not necessarily require an extensive knowledge in science and literature, but rather mechanical skill, which having learned, they might be ordained and licensed, like Fourier's Sacred Band, to do such duties as are distasteful

and likely to be neglected by the D.D.S.,—missionaries, as it were, to a benighted public, who now under the flickering gasoline light sit and allow these devils who go up and down our country, seeking whom they may devour, to scatter their teeth about the public market-places while the band plays, saving them from this quack and his brethren, the vitalized-air and local-anesthetic fiends, by teaching the use of the tooth-brush and the saving power of amalgam filling, and after thus having served humanity for some time and honestly earned enough money by only asking the same fee for saving teeth as is now willingly paid for destroying them, might take a further course at college.

Three hundred years before Christ, Erasistratus, a dentist of ancient Greece, is said to have deposited in the temple of the Delphian Apollo a leaden tooth-forceps, to impress upon all beholders that only those teeth should be extracted which could be removed with such an instrument. Might not in our day such an emblem be profitably suspended in every church and public school-house, or at least in every medical college and dental office?

Discussion.

Dr. Edgar Palmer said that the indiscriminate use of these secret compounds for local anesthesia should be absolutely and sternly discountenanced. He had never used any such. He had very carefully and rarely used a formula which had been recommended to him by one whom he could trust. He knew of cases where septicæmia had been caused by a hypodermic injection of such a preparation by one who was exhibiting it for advertising purposes, causing one death and severe trouble to several.

Dr. Taft said that every dentist should stamp his disapproval on everything which is brought out as a nostrum, and never lose an opportunity to warn people of the dangers of the traveling quack who goes from town to town, and either from the gaudy chariot or in the dental parlor extracts teeth without pain. The danger of operating on one patient right after another, using the same syringe and the same forceps, is so serious that if it were understood their occupation would be gone. Besides the danger of infection is the necessity of having the nostrum strong enough to be effective in every case; this means that for those who would be easily influenced it is dangerously strong. People should be intelligent enough to know that they should not sacrifice teeth except when they cannot be saved, and that one whose business is only to extract is not working for the good of the patients, but of his own pocket. The profession should set its face as a flint against such practices, and treat such operators as the Irishman treated the crowd in the fight,—“Whenever you see a head, hit it,” and crush it if possible.

Dr. S. Saxe spoke of a man who came to his town, and with a grand flourish of advertisements announced himself as a famous dentist, and agreed to extract all teeth painlessly, and to refund the money unless he did so. The quack referred to, who really was a graduate and sported the D.D.S. after his name, pocketed over three hundred dollars a week, while the conscientious dentists in the town were helpless to hinder the harm he did. The only way the dentists could stop such disastrous proceedings is to educate the people as to the value of the natural teeth, and the means necessary to preserve their usefulness.

Dr. Brown said that he knew of one of these painless-extracting fiends, who, having guaranteed to extract with absolutely no pain, had been sued for damages by several sufferers upon whom the anesthetic had not had the desired effect, and had had to pay the damages and seek new fields for practice.

Dr. Edgar Palmer said, on account of his position in the state society he always heard of these cases as soon as they advertised, and that he had taken pains to discover that this man was a graduate of the University of Pennsylvania. Upon learning this, he had written to Dr. Darby, sending him a copy of the advertisement. Dr. Darby had replied that he had communicated with the fellow, and would let him know what he said when he received his reply.

Dr. Taft said we cannot hold the institution which graduates a man responsible for his future acts, and after a man has graduated the institution can exercise very little control over him. In some states the law will take hold, but in most states we can do nothing.

Dr. Benson thought that in cities the boards of health should prevent such practices. The ignorant public should be protected from the loss of their teeth, which loss will surely result in danger or injury to their future health.

Dr. V. A. Latham thought that the diploma should contain an agreement that advertising or other grossly unprofessional conduct would work a revocation of the diploma. This was the case in Great Britain, where a dentist who had received a diploma from any of the institutions which issued them, and who should be convicted of unprofessional conduct, would have his diploma annulled, his name stricken from the registry, and would be fined or imprisoned should he describe himself as a dentist, or use the initials of his degree after his name.

On motion, the discussion was closed.

(To be continued.)

CONNECTICUT VALLEY DENTAL SOCIETY.

At the last annual meeting of the Connecticut Valley Dental Society, held at Hartford, Conn., May 17, 1893, the following officers were elected for the ensuing year :

Dr. W. H. Rider, Danbury, Conn., president ; Dr. W. O. Barrett, Ware, Mass., Dr. C. C. Barker, Meriden, Conn., vice-presidents ; Dr. George A. Maxfield, Holyoke, Mass., secretary ; Dr. A. J. Cutting, Southington, Conn., assistant secretary ; Dr. F. R. Rice, North Adams, Mass., treasurer.

At the union meeting of the Connecticut Valley Dental Society and the Connecticut State Dental Association, held at Hartford, Conn., May 16, 17, and 18, 1893, the following resolutions were unanimously adopted :

WHEREAS, Several compounds or processes, more or less familiar to the dental profession, have and are being promiscuously advertised as secret, and those which have been proved either useless or injurious advertised as wonderful ; and

WHEREAS, Such false and vicious advertising is a detriment to our patients and ourselves ; and

WHEREAS, All known local applications powerful enough to completely destroy the sensibility are capable of doing serious injury to tooth-structure and possibly to health; therefore

Resolved, That we hereby condemn the practice of the use of such nostrums by the profession, and recommend that any and all legitimate means be used by the members of our societies to educate the public and guard them against possible harm which may result from the use of these nostrums.

COLORADO STATE DENTAL ASSOCIATION.

THE seventh annual meeting of the Colorado State Dental Association convened June 6, 1893, in Denver. There was a good attendance. Fourteen essays were read; they were well discussed, with much good to all present. The election of officers resulted as follows: P. T. Smith, Denver, president; W. S. Brennaman, Leadville, first vice-president; W. R. Sinton, Colorado Springs, second vice-president; A. H. Sawins, Denver, recording secretary; Sarah May Townsend, Denver, corresponding secretary; William Smedley, Denver, treasurer. Executive Committee, H. A. Finn, Denver; A. C. Watson, Denver; and George H. Harlen, Montrose. Dr. M. A. Bartleson, of Denver, was chosen delegate to the World's Columbian Dental Congress at Chicago, August 14 to 19. Dr. Thomas Gaddes, of London, England, formerly dean of the dental department of the Denver University, was elected to honorary membership; eleven were elected as members of the association.

Adjourned to meet at Glenwood Springs the first Tuesday in June, 1894.

SARAH MAY TOWNSEND, *Corresponding Secretary*.

ILLINOIS STATE DENTAL SOCIETY.

THE twenty-ninth annual meeting of the Illinois State Dental Society was held, in conjunction with the Iowa State Dental Society, at Rock Island and Davenport, May 9-12, 1893. The following officers were elected for the ensuing year: Garrett Newkirk, Chicago, president; J. W. Cormany, Mt. Carroll, vice-president; Louis Ottofy, Chicago, secretary; W. A. Stevens, Chicago, treasurer; F. H. McIntosh, Bloomington, librarian.

LOUIS OTTOFY, *Secretary*.

WASHINGTON STATE DENTAL SOCIETY.

THE Washington State Dental Society held its sixth annual meeting in Olympia, May 4, 5, and 6, 1893. Papers were read and clinics given by several of the leading dentists of the state. The following officers were elected for the ensuing year: Dr. P. H. Carlyon, Olympia, president; Dr. B. S. Scott, Ellensburg, first vice-president; Dr. C. A. Darling, Fairhaven, second vice-president; Dr. A. S. Oliver, Olympia, secretary; Dr. J. N. Prather, Seattle, treasurer.

The next meeting will be held in Tacoma, in May, 1894.

A. S. OLIVER, *Secretary*,
Olympia, Washington.

DENTAL SOCIETY ANNOUNCEMENTS.

SECTIONS AND SECTION OFFICERS OF THE WORLD'S COLUMBIAN DENTAL CONGRESS.

"PURE SCIENCE."—DEPARTMENT A.

Section 1, Anatomy and Histology.—R. R. Andrews, Cambridge, Mass., chairman; E. P. Beadles, Danville, Va., vice-chairman; F. T. Breene, Iowa City, Ia., secretary.

Section 2, Etiology, Pathology, and Bacteriology.—G. V. Black, Jackson-ville, Ill., chairman; George S. Allan, New York, N. Y., vice-chairman; E. S. Chisholm, Tuscaloosa, Ala., secretary.

Section 3, Chemistry and Metallurgy.—D. R. Stubblefield, Nashville, Tenn., chairman; J. S. Cassidy, Covington, Ky., vice-chairman; E. V. McLeod, New Bedford, Mass., secretary.

Section 4, Therapeutics and Materia Medica.—F. J. S. Gorgas, Baltimore, Md., chairman; N. S. Hoff, Ann Arbor, Mich., vice-chairman; George E. Hunt, Indianapolis, Ind., secretary.

"APPLIED SCIENCE."—DEPARTMENT B.

Section 5, Dental and Oral Surgery.—T. W. Brophy, Chicago, Ill., chair-man; M. H. Cryer, Philadelphia, Pa., vice-chairman; J. F. Griffiths, Salis-bury, N. C., secretary.

Section 6, Operative Dentistry.—William Jarvie, Brooklyn, N. Y., chair-man; Daniel N. McQuillen, Philadelphia, Pa., vice-chairman; Henry W. Morgan, Nashville, Tenn., secretary.

Section 7, Prosthesis, Orthodontia.—C. L. Goddard, San Francisco, Cal., chairman; T. S. Hacker, Indianapolis, Ind., vice-chairman; E. H. Angle, Minneapolis, Minn., secretary.

Section 8, Education, Legislation, Literature.—J. J. R. Patrick, Belleville, Ill., chairman; H. L. McKellops, San Francisco, Cal., vice-chairman; W. H. Whitslar, Cleveland, Ohio, secretary.

COLUMBIA DENTAL CLUB OF CHICAGO.

THE house of the Columbia Dental Club of Chicago, No. 300 Michigan avenue, is open wide to the gentlemen of the profession who visit Chicago this summer, and a cordial invitation is extended to them to make it their headquarters while in the city.

By addressing the manager of our bureau of information, R. C. Brophy, in care of the club, gentlemen can secure such rooming accommodations as they wish.

FRANK H. GARDNER, *Chairman Local Com. on Entertainment.*

MAINE DENTAL SOCIETY.

THE twenty-eighth annual meeting of the Maine Dental Society will be held in Portland, Tuesday and Wednesday, July 18 and 19, 1893.

The Board of Dental Examiners will hold a meeting for examinations in Portland, July 19, at two o'clock.

E. C. BRYANT,

Secretary Maine Dental Society.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE annual meeting of the National Association of Dental Faculties will be held in the house of the Columbia Dental Club, No. 300 Michigan avenue, Chicago, Ill., beginning on Thursday, August 10, at ten o'clock A.M., and continue probably through that and the succeeding day. It is important that all matters of business to come before that meeting be properly prepared beforehand, so that business can go promptly forward. It is to be hoped that all persons interested will give special attention to this request, and that every member be promptly present at the beginning of the meeting, as only the two days will be available for the work.

J. TAFT,
FRANK ABBOTT, } *Executive Committee.*
A. O. HUNT,

NEW JERSEY STATE DENTAL SOCIETY.

THE twenty-fourth annual meeting of the New Jersey State Dental Society will convene at the West End Hotel, Asbury Park, July 19, 1893, and continue in session the 20th and 21st. Papers of interest will be read, and clinics by prominent dentists will be given.

The S. S. White Dental Manufacturing Co. and the Edison Electric Co. will make specially large exhibits in motors, engines, fans, etc. The best hotel in the Park; rates, \$2.50 and \$3.00 per day.

CHARLES A. MEEKER, D.D.S., *Secretary*,
29 Fulton street, Newark, N. J.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE twenty-fifth annual meeting of the Pennsylvania State Dental Society will be held at the Mountain House, Cresson, Pa., on Tuesday, July 11, 1893. Convenes at 10 A.M. One-day session.

C. V. KRATZER, *Secretary*,
Reading, Pa.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE twenty-third annual meeting of the South Carolina State Dental Association will be held in Columbia, Tuesday, August 8, 1893, continuing four days. All members of the profession are cordially invited to be present.

C. S. PATRICK, *President*.
B. RUTLEDGE, *Recording Secretary*.

CALIFORNIA STATE BOARD OF DENTAL EXAMINERS.

A MEETING of the California State Board of Dental Examiners, for the examination of applicants to practice dentistry in this State, will be held in San Francisco, Tuesday, August 1, 1893, commencing at 9 A.M., instead of August 8, as previously announced.

J. L. ASAY, *President*.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS.

THE South Dakota State Board of Dental Examiners will meet in Yankton, S. D., July 13, 1893, and continue in session two days, for the purpose of making examinations and passing on diplomas of any one who may desire to begin the practice of dentistry in this state. No examinations made or certificates issued except at regular annual meetings. Any one desiring to appear before the examining board at that time will oblige by notifying the secretary at once.

W. H. H. BROWN, *Secretary*,
Yankton, S. D.

 EDITORIAL

DENTAL ETHICS.

IT has not been our custom to direct attention editorially to the character of articles which have appeared in the department of the DENTAL COSMOS devoted to original communications. The paper by Dr. Dean in this issue is one, however, that we regard as of such importance as to demand especial consideration. Much has been said and written upon the subject of dental ethics; arguments for and against a formulated code have been indulged in; nearly every side of the subject has been presented, and the matter is apparently in as chaotic a condition as ever, if we are to judge by the uncompromising attitude of those who are still defending the most diametrically opposite views of the question.

A defect which has so far characterized all attempts to elucidate the problems concerned in dental ethics has been the failure to properly recognize the fundamental factors involved and the proper objects to be attained. In the DENTAL COSMOS for March, 1892, we endeavored, in an editorial on "Professional Development in Dentistry," to show that the development of the ethical sense of the profession must take place in harmony with biological principles; that as a matter of fact it was so developing, but that the rate of such development was necessarily slow, considered apart from intelligent co-operation as a guiding factor; that the main concern of nature was the conservation of the race; that the necessity for the existence of the community or race as such, as well as its ability to exist, is greater than that of the individual, which fact comes in time to be recognized by the individual, and there is then developed in him the altruistic instinct which expresses itself as a desire for the conservation of the community of which he is a unit. The subordination of the individual interest to the common welfare being the natural outgrowth of biological processes, a recognition and practical application of the fact was urged as the most promising and in fact only possible means for truly professional progress.

The scientific study of ethics is of but recent date, and is a natural outgrowth of the application to the study of human character of the scientific method which has yielded such fruitful results in the physical and natural sciences. While much has been done, especially in divesting the subject of its superstitious and emotional impedimenta, the field is still largely unexplored. Dr. Dean's article is, so far as we have knowledge, the best contribution to the subject of dental ethics which has been thus far written. It is in harmony with sound biological principles, and fully abreast of the latest thought of the best thinkers in the field of ethical investigation.

He does not attempt to solve the problem of the code, but he clearly indicates the lines upon which its proper solution must take place, even going so far as to specify the fundamental laws which must govern the relations of dentists to patients, the questions of advertising and of patents and of secret preparations. His defence of a code is admirable and is probably impregnable. As long as ethical imperfection exists, so long will a code be necessary. The only logical procedure, therefore, is not to dispense with the code, but to so improve it, from time to time, that its faults shall be continually minimized. The distinguishing feature of the article is the comprehensive view which is presented of the entire subject, and the logical assignment of dental ethics to its correct position as a subordinate department (class ethics) of the general subject,—secondary not only in position, but also in importance of its object. The majority of writers on dental ethics have written apparently in the belief that the conservation of the interests of dentists as a class was, or unquestionably should be, the first concern in any ethical formula pertaining to them.

The same idea has largely colored the efforts which have been made with respect to dental legislation. In the latter case, all attempted efforts at dental legislation based on proposed benefits primarily to the class have generally failed, because such legislation is repugnant to the spirit of the common law, whose avowed object is the conservation of the interests of the community, and not the class elements which are tributary to it.

Upon this point Dr. Dean's paper is definite and clear. He says, "The rules governing any class must be such as subserve the welfare of the community ;" and again, "A dental code is not ethical unless it primarily furthers the welfare, not of dentists, but of the community, to which dentists are tributary and which they should serve,—primarily, because the principle referred to does not interdict a regard on the part of dentists for the welfare of their own class ; it simply makes that welfare secondary, giving the good of the community first place." The doctrine thus stated we believe to be not

only sound, but for the reasons first given as to its accordance with the principles of biological development, it seems to be incontrovertible. If it is freely accepted, as it should be, as the basis of future revisions of our code of ethics, it furnishes a standard, a norm by which any ethical maxim in dentistry may be tested as to its soundness, and thus lead to the formulation of a code which shall more perfectly fulfill the requirements of all who need a more explicit ethical standard than that embodied in the golden rule.

SECTIONAL ARRANGEMENT OF THE WORLD'S CONGRESS.

ELSEWHERE we publish the sectional arrangement of the World's Columbian Dental Congress, with the *personnel* of the organization as finally completed. Eight sections are provided, under the two general departments of "Pure Science" and "Applied Science." This arrangement, with respect to the scope and distribution of the several branches which are tributary to dental science and art, leaves little if anything to be desired. The officers are men chosen after careful consideration, and were selected because of their known efficiency and special fitness for their several departments. When it is noted that the real work of the congress will be directed and its character to a large extent determined by the efficient management of the section officers, the happy selection of the men to fill these important positions is cause for congratulation by all who are interested in the success of the congress.

"PALMAM QUI MERUIT FERAT."

THE *Dental Record* of June, 1893, says in an editorial with the above title, "We are frequently having paragraphs sent us, clipped from small local papers, with some such legend as the following: 'Mr. So-and-so has just returned from a visit to America, where he has received an honorary degree of D.D.S., conferred upon him in recognition of his labors in the dental profession for fifteen or twenty years' (as the case may be). It is indeed pitiable if the recipient of such honors (?) are honest in their acceptance of these degrees, and it shows a most lamentable ignorance of the meaning of degrees in general and American degrees in particular," etc.

If the editor of the *Dental Record* had made himself familiar with the laws governing the conferring of the degree of D.D.S. by American dental colleges, he would have known that any such statement as made in the newspaper clippings which he quotes is a bald lie upon its face; and inasmuch as he says, "If the recipient of such honors (?)

are [*is*] honest in their [*his*] acceptance, etc.," he evinces his belief that such degrees have been conferred and accepted. In this the editor plainly displays an ignorance of "American degrees in particular" which is fully as lamentable as that of the "Mr. So-and-so" who said he had received the "honor (?)."

The degree of D.D.S. is never given and cannot be obtained in America excepting after attendance upon the full curriculum and compliance with the requirements prescribed by the National Association of Dental Faculties. The degree may be given *honoris causa* in cases where such action is eminently proper, based on the *Palmarum qui meruit ferat* principle, under a provision made in the by-laws of the National Association of Dental Faculties as follows :

"Resolved, That the degree of Doctor of Dental Surgery shall not be conferred honorarily by any college belonging to this Association, except by consent of this Association."

This law was passed in 1889.

The only one infraction of this rule by a reputable college in this country brought down upon it a vote of censure by the Faculties Association last year.

We suggest that our esteemed contemporary would do well to become familiar with the facts of dental legislation in this country within a reasonable number of years of the present time, before extensively criticising the status of the American degree of D.D.S. from the standpoint of his present knowledge.

THE PHYSICIAN IN DENTISTRY.

IN connection with the agitation for a higher standard of dental education for dentists, we submit the following from the *Times and Register*, April 15, 1893, as being in evidence of the same need of a higher standard of dental education for medical practitioners, especially those who incidentally figure as teachers :

LOCAL ANESTHETIC.

I wish you would give me a good local anesthetic that will relieve pain in extracting teeth ; also for opening abscesses. I see advertised by some house the painless extracting of teeth. I did not send my dollar, as I think it is a humbug. Please give me a good anesthetic, without using an atomizer. How is cocain? I have not been pleased with it. Long life to the *Times and Register*.—Z. H. MILLARD, M.D., Thackeray, Ill.

[Nothing has taken the place of cocain, although other drugs possess the property of inducing local anesthesia. Brucin and antipyrin may be mentioned, and perhaps a mixture of the three would be advantageous, as the brucin would counteract the sedative effect of the others upon the heart. At present, the best plan is to inject a strong cocain solution (20 per cent.) into the gums.—ED. T. & R.]

BIBLIOGRAPHICAL.

THE PACIFIC COAST DENTIST. Published by the Pacific Coast Dental Publication Co., San Francisco, Cal.

This is the title of a new monthly dental journal which begins its existence with the June number. Its avowed purpose is the stimulation of dental interests and the publication of dental literature in relation to the Pacific slope. Our western confrères are enthusiastic and progressive. They have accomplished much good work, and we bespeak for them large success in their journalistic enterprise, of which the first issue gives good promise.

NAPHEYS' MODERN THERAPEUTICS, MEDICAL AND SURGICAL, INCLUDING THE DISEASES OF WOMEN AND CHILDREN. Ninth edition, revised and enlarged. Volume II. General Surgery, Gynecology and Obstetrics. Edited by ALLEN J. SMITH, M.D., and J. AUBREY DAVIS, M.D. Royal octavo. Half Russia, marbled edges. Pp. 1112. Philadelphia: P. Blakiston, Son & Co., 1893. Price, \$6.00.

Favorable notice of the first volume of this standard work was given at the time of its publication, in the DENTAL COSMOS for December, 1892. The present volume is an extension of the work along the same general lines, and includes three main divisions,—General Surgery, Obstetrics, and Gynecology. Under Lesions of the Digestive System is a section upon oral diseases, including caries of the teeth and toothache, which is a veritable museum of antiquities. While the formula for Dr. Flagg's "Escharotic Paste for Destroying the Nerve," and three other formulæ for odontalgia which are "fearfully and wonderfully made," are credited to other authors, the remainder of the article is by Professor James E. Garretson.

As the article is written mainly for the enlightenment of physicians, it probably does not have the especial importance which it would if intended for the instruction of dentists, for the simple reason that the care of the mouth and teeth is so largely relegated to dental specialists that such teaching to physicians will result in relatively less harm to the patient. But to quote from the authority in question, he says (p. 397), "Caries is a disease most markedly of congenital association and predisposition. It may be confidently prognosed that the offspring of parents affected in this way will be in like manner afflicted; and that, on the other hand, the children of parents possessing good teeth will be in like manner favored. The general dyscrasiæ exert an injurious influence upon the teeth, imparting to them a low grade of vitality, and rendering them incapable of resisting the chemical action of the agents with which they are necessarily brought in contact. Of

these agents the following are the most common and injurious : 1. Mucous deposits. The mucoid fluid is often found to be glairy and tenacious, *alkaline to the test*, and more or less offensive in odor,—a condition universally associated when a habit with dental caries and general dyscrasia. . . . *Teeth so diseased find relief alone in acids*, not only locally employed, but also internally administered. . . . The different kinds of acids found in the mouth furnish indications for constitutional treatment. . . . Animal and vegetable fungi in the mouth are added causes of the deterioration of teeth. . . . Sugar is not directly deleterious to the teeth, but only indirectly as it disturbs digestion."

Under "palliative treatment of pulpitis" he says, "An inflammation of the dental pulp, if not too far advanced, will almost invariably be broken up by the administration of bromide of potassium, gr. v-xl, the application of a mustard poultice to the back of the neck, and a hot foot-bath continued from twenty minutes to half an hour." The foregoing is a fair sample of the character of the article,—a dental subject treated by a medical teacher; and yet the crying need of the dentist is that he shall be medically educated!

A PRACTICAL TREATISE ON MATERIA MEDICA AND THERAPEUTICS, WITH ESPECIAL REFERENCE TO THE CLINICAL APPLICATION OF DRUGS. By JOHN V. SHOEMAKER, A.M., M.D., Professor of Materia Medica, Pharmacology, Therapeutics, and Clinical Medicine, and Clinical Professor of Diseases of the Skin in the Medico-Chirurgical College of Philadelphia, etc. Second edition, revised. In two royal octavo volumes. Volume I, 353 pages: Devoted to Pharmacy, General Pharmacology, and Therapeutics and Remedial Agents not Properly Classed with Drugs. Volume II, 680 pages: An Independent Volume upon Drugs. Volume I, in cloth, \$2.50 net; sheep, \$3.25 net. Volume II, in cloth, \$3.50 net; sheep, \$4.50 net. Philadelphia: The F. A. Davis Company, 1893.

In many respects, this is the best work upon the subject within our knowledge. It is replete with information covering the whole field of materia medica and therapeutics. A reduction in the multiplicity of prescriptions given would doubtless strengthen its educational value, as such helps tend rather to the empirical use of remedies than to their rational employment after a full study of the subject.

Both author and publishers are to be congratulated upon the result, which is a decided improvement upon the first edition.

PAPERS AND FIRST ANNUAL REPORT OF THE WOMEN'S DENTAL ASSOCIATION OF THE UNITED STATES.

This little pamphlet of twenty closely printed pages contains a general summary of the first year's work of the Women's Dental

Association of the United States. Editorial mention of this organization was made in the DENTAL COSMOS for August of last year, in which connection our belief in the rightfulness of their cause and the propriety of forming such an association was expressed.

The annual report makes a creditable showing as to the character of the work already accomplished, and evinces a promise of more and far-reaching results for the future.

At the meetings held from October, 1892, to February, 1893, inclusive, papers were read and discussed on the following subjects: "Extracting a Specialty," by Dr. Maria Lasser; "Devitalization as a Factor in the Conservation of Teeth," by Dr. Eliza Yerkes; "Art in Dentistry," by Dr. Annie T. Focht; "Demonstration of Some Mouth-Bacteria," by Professor Albert P. Brubaker; "Dangers Arising from Syphilis in the Practice of Dentistry," by Dr. Emily W. Wyeth.

The membership of the association at the close of its first year, March 19, 1892, was thirty-two, all of whom are graduates. Ten regular monthly meetings were held at the offices of several members, all of which were well attended.

Essayists for the remainder of the year 1893 have been appointed, and the society gives every evidence of vigorous vitality and active usefulness in its particular field.

OBITUARY.

DR. WILLIAM F. REHFUSS.

DIED, in Philadelphia, Pa., March 28, 1893, of Bright's disease, WILLIAM FREDERICK REHFUSS, D.D.S., in the twenty-seventh year of his age.

The death of Dr. Reffuss at so early an age is an undoubted loss to the dental profession, as he was a man of unusual ability, giving much promise of valuable work for the future. He was born in Philadelphia, March 1, 1867. He graduated at the Central High School in 1884, and commenced the study of dentistry with Dr. Thomas Robson; entered the University of Pennsylvania, Dental Department, and received the degree of D.D.S. from that institution with the class of 1887. He practiced his profession in Philadelphia, and had established a branch office at Ocean Grove, N. J., for the summer season.

Dr. Reffuss was a student, and diligently employed the few years that were allotted him in his chosen profession in experimenting and recording the results of his labors in essays for the dental periodicals. The work which will probably make him most widely known, and upon which he was engaged for several years, is his "Treatise on Dental Jurisprudence, for Dentists and Lawyers," published by the Wilmington Dental Manufacturing Company in 1892. An extended critical notice of this volume may be found in the DENTAL COSMOS for October, 1892.

Dr. Reffuss was a member of the Odontological Society of Pennsylvania,

and of the New Jersey State Dental Society. He took an active part in whatever pertained to the advancement of his profession. He was of a modest disposition, and courteous in his intercourse with his fellow-men. He was unmarried, but was engaged to an estimable young lady of Brooklyn, N. Y. His life, though brief, was well and honorably spent.

DR. FRANKLIN MORRIS DIXON.

DIED, at Philadelphia, June 4, 1893, Dr. FRANKLIN MORRIS DIXON, aged seventy-four years.

Dr. Dixon was born in Petersburg, Pa., April 15, 1819. His parents were James and Ann Dixon, and he was the eighth in a family of twelve children. In 1842, at the age of twenty-three, he entered the office of Dr. Elisha Neall, of Philadelphia, as a student, spending one year with his preceptor in learning to carve teeth, swage plates, and acquiring a knowledge of the principles and art of mechanical dentistry. He entered upon the practice of his profession, continuing in the work until the close of his life, thus rounding out a full half-century of activity in his chosen profession. Dr. Dixon was one of those practitioners whose years of service link the past of dentistry with its present. He entered the profession when it was scarcely more than an art characterized by skill in handicraft. He lived to see it develop to its present proportions and importance, and was always in all stages of its growth in the front rank, abreast of its best operators. He was an artist in the manipulation of gold foil, and so long as he was able to stand at his chair his work was conspicuous for its beauty, and all of his operations for their faithful performance. He was, in the highest sense, a conscientious and successful operator, and one whose professional method and skill was never questioned. He married, in 1858, Miss Atlee, daughter of Solomon Atlee, of Philadelphia. Nine children were born to them, of whom four daughters with their mother survive him.

DR. W. R. LONG.

DIED, at Cleveland, Ohio, April 28, 1893, of typhoid fever, Dr. W. R. LONG, in the twenty-ninth year of his age.

Dr. Long was born at Cambridge, Ohio. He was a graduate of the University of Pennsylvania. In 1890 he went to Santiago, South America, where he remained for two years, when, owing to the rebellion, he was forced to return. He then established himself in practice in Cleveland.

Dr. Long was a young man of more than ordinary promise, and had shown much skill and enthusiasm in his chosen profession. He was of a genial disposition, and was socially popular. In December last he was married to Miss Mary N. Ellsworth, of Cleveland.

DR. FREDERICK A. LEVY.

At the quarterly meeting of the American Academy of Dental Surgery of New Jersey, held May 27, 1893, at Newark, N. J., the following was reported :

WHEREAS, In the death of Frederick A. Levy, D.D.S., one of the corporate board of the American Academy of Dental Surgery of New Jersey, this body

has lost one of its most earnest and hard-working members, and a man whose studied effort was the advancement of the dental profession throughout the state and country; therefore be it

Resolved, That this expression of our regard be spread on the minutes of the society, and a copy forwarded to the leading dental journal for publication.

CHAS. A. MEEKER, D.D.S.
FRED. C. BARLOW, D.D.S. } *Committee.*
GEO. E. ADAMS, D.D.S. }

DR. W. W. ALLPORT.

THE following resolution was adopted by the Odontological Society of Chicago at its last regular meeting, May 16, 1893:

Resolved, That in the death of Dr. W. W. Allport the dental profession has lost one of its most distinguished members. As an operator he had no superior, and as a fellow-practitioner he always cheerfully imparted to others his methods of practice;

Resolved, That we tender to the members of his family our sympathy, and that a copy of this resolution be sent to them and to the dental journals for publication.

TRUMAN W. BROPHY,
A. W. HARLAN,
FRANK H. GARDINER, } *Committee.*

The following resolutions were adopted by the Chicago Dental Society:

WHEREAS, In the death of Dr. W. W. Allport, a leader in our profession has fallen, and as a mark of our appreciation of his services and skill be it

Resolved, That in his death the dental profession has lost a member whose extraordinary skill as an operator placed him among the foremost dentists of the world. His work in promoting the highest interests of the profession will ever be conspicuous, and the prosperity enjoyed by younger members is due in a great measure to his achievements;

Resolved, That a copy of this preamble and resolutions be sent in proper form to the family of the deceased, and also to the dental journals for publication.

TRUMAN W. BROPHY,
A. W. HARLAN,
J. N. CROUSE, } *Committee.*

DENTAL LEGISLATION.

SUPPLEMENT TO THE DENTAL LAW OF PENNSYLVANIA.

THE following supplementary act has been passed by the Legislature and approved by the Governor:

AN ACT making it unlawful for any person to engage in the practice or assume the title of doctor of dental surgery, or advertise himself as a doctor of dental surgery, without first procuring a diploma from a reputable institution recognized by the National Board of Dental Examiners, and defining who shall be understood as practicing dentistry, and authorizing State Board of Dental Examiners to charge and collect certain fees.

SECTION I. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in general assembly met, and it is hereby enacted by the authority of the same, That from and after the passage of this act it shall not be lawful for any person in the State of Pennsylvania to engage in the practice of dentistry or assume the title of doctor of dental surgery, or advertise himself or herself as a doctor of dental surgery, without first having graduated and receiving a diploma conferring the degree of doctor of

dental surgery or other recognized dental degree from a reputable institution recognized as of good repute by the National Board of Dental Examiners and legally competent to confer the same, and having said diploma indorsed by the State Board of Dental Examiners and recorded according to requirement of the act of June 20, 1883; *Provided*, That physicians and surgeons may in the regular practice of their profession extract teeth for the relief of pain or make applications for such purpose.

SEC. 2. Every person shall be understood as practicing dentistry within the meaning of this act who shall for fee, salary, or other reward, either to himself or another person, operate upon human teeth, furnish artificial substitutes, or perform those acts as assistant or principal usually understood as and called dental operations; *Provided*, That *bona fide* students of dentistry, under the immediate supervision of a preceptor who is in lawful practice, may assist him in operations during the usual term of pupilage, not to exceed two and one-half years from the date of commencement.

SEC. 3. The State Board of Dental Examiners is hereby authorized to collect a fee of not less than one dollar for each indorsement of a diploma required by the act of June 20, 1883; said amount to be paid by the holder of diploma as a prerequisite to indorsement. In all cases the members of the State Dental Examining Board shall, by written or oral examination or otherwise, satisfy themselves as to the fitness and qualifications of the holder of a diploma before indorsement is made, and in their discretion refuse to indorse the diploma of an applicant who is found incompetent.

When an examination is considered necessary, the said board is authorized to collect from the applicant a fee of five dollars, which sum shall be refunded in case his diploma is not indorsed.

SEC. 4. In case a graduate of one of the dental schools of this state shall desire and intend to begin the practice of dentistry in a foreign country beyond the bounds of the United States, and shall make affidavit duly certified as to the fact, and shall ask for the indorsement of the State Board of Dental Examiners, then said State Board being satisfied as to the character and qualifications of the applicant and the good repute of the institution issuing said diploma, may indorse the same, and for each such indorsement shall collect a fee of not less than ten dollars.

SEC. 5. Any violation of the provisions of this act shall constitute a misdemeanor, and shall subject the party violating it to a penalty of not more than one hundred dollars for each offense.

SEC. 6. This act shall not apply to persons who have been engaged in the active practice of dentistry in Pennsylvania from the date of the passage of the act of June 20, 1883.

SEC. 7. It shall not be lawful for any recorder to place upon record any diploma of date later than September 20, 1883, unless said diploma has been indorsed and approved by the State Board of Dental Examiners or the secretary of said board.

SEC. 8. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

DENTAL LAW OF NEW MEXICO.

FOLLOWING we give the full text of the law regulating the practice of dentistry and creating a Board of Dental Examiners for the Territory of New Mexico, which was approved and went into effect February 23, 1893:

Be it enacted by the Legislative Assembly of the Territory of New Mexico:

SECTION 1. That it shall be unlawful for any person who is not at the time of the passage of this act engaged in the practice of dentistry in the Territory of New Mexico to commence such practice unless such person shall have received a certificate from the duly authorized board of dental examiners hereinafter provided for.

SEC. 2. A board of dental examiners to consist of five practicing dentists within the Territory of New Mexico is hereby created, whose duty it shall be to carry out the purposes and enforce the provisions of this act. The mem-

bers of said board shall be appointed by the governor. The term for which the members of said board shall hold their offices shall be four years, and until their successors shall be appointed. In case of a vacancy occurring in the membership of said board such vacancy shall be filled by appointment by the governor.

SEC. 3. The said board shall within sixty days after their appointment meet at the capital of the Territory of New Mexico, and organize by electing one of its members president and one secretary thereof. Said board shall meet at least once in each year thereafter, and as often and at such times and places as it may deem proper and necessary. A majority of said board shall at all times constitute a quorum for the transaction of business.

SEC. 4. It shall be the duty of every person who at the time of the passage of this act is engaged in the practice of dentistry in the Territory of New Mexico within six months from the date of the passage of this act to cause his or her written application to be filed with the secretary of said board for a certificate to continue in the practice of dentistry within said Territory; and all persons whom the board may find to have been engaged in the practice of dentistry within the Territory of New Mexico for the period of one year next preceding the passage of this act shall be entitled to receive a certificate from said board of examiners without further examination.

SEC. 5. No person whose name is not registered on the books of said board as a regular practitioner of dentistry, within the time prescribed in the next preceding section, shall be permitted to practice dentistry within the Territory of New Mexico until such person shall have been duly examined by said board and regularly licensed in accordance with the provisions of this act: *Provided, further*, That all persons presenting a diploma from a college recognized as reputable by the National Association of Dental Examiners and paying the sum of five dollars to the secretary of the board shall be entitled to receive a certificate without further examination.

SEC. 6. In order to provide the means for carrying out and enforcing the provisions of this act said board of examiners shall charge each person applying for a certificate to continue in the practice of dentistry the sum of five dollars for said certificate, and all persons applying for an examination to procure a certificate to commence the practice of dentistry within the Territory of New Mexico shall pay to the secretary of said board, before submitting to said examination, the sum of twenty-five dollars.

SEC. 7. Any person holding a license from said board who shall be charged with immoral or unprofessional conduct may, if found guilty as charged, upon proper investigation had by said board, have his or her license revoked by said board.

SEC. 8. All moneys received by the board shall be held by the secretary thereof as a special fund for paying the necessary expenses and for enforcing the provisions of this act.

The secretary shall give to the board a good and sufficient bond, to be approved by said board and in an amount to be fixed by the board.

SEC. 9. No part of the salary or other expenses of said board shall be paid out of the Territorial treasury.

SEC. 10. It shall be the duty of the secretary of the board to make an annual report to the governor of the Territory, at such times as may be directed by the board, and such report shall be signed and approved by the president of the board.

SEC. 11. Any person who shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof may be fined not less than twenty dollars nor more than one hundred dollars, or be imprisoned in the county jail not less than one month nor more than three months, or by both such fine and imprisonment, in the discretion of the court trying said cause.

SEC. 12. Any justice of the peace of the county in which such violation was committed shall have jurisdiction in all cases of violations of this act, and it shall be the duty of the respective county attorneys to prosecute all violations of this act.

SEC. 13. Nothing in this act shall be construed to interfere with physicians and surgeons in their practice as such.

SEC. 14. This act shall be in force from and after its passage.

The Board of Dental Examiners appointed under the above law was organized April 20, 1893, as follows: F. E. Olney, president, East Las Vegas; D. W. Manley, secretary and treasurer, Santa Fé; L. H. Chamberlin, Albuquerque; A. A. Bearup, Roswell; H. R. King, Deming.

PERISCOPE.

THE CHEMISTRY AND THERAPEUTICS OF NITROUS OXID.—For some inexplicable reason, nitrous oxid, which is a valuable adjuvant in the alleviation of human suffering, seems to have been almost entirely relegated to the dental profession. In fact, it is used almost entirely to effect the painless extraction of teeth. There are, however, many other minor operations just as painful as tooth-extraction, whose technique is just as simple and whose successful issue demands no more time. Why are these not consummated under nitrous-oxid anesthesia?

Frequently it is desirable, if not absolutely necessary, to yield to the plea for "something to keep it from hurting," even in apparently trivial operations, especially if the nervous, emotional, impressionable elements preponderate in the patient's organization. The injection of cocain is neither altogether painless nor entirely free from danger, the toxicity of the drug being to a certain extent a not altogether well-defined or accurately determined property, small doses sometimes causing dangerous and alarming symptoms, and *vice versa*.

Chloroform is certainly not free from danger, although its administration is not altogether unpleasant. As Lauder Brunton has tersely said, "It is like a sharp knife in the hands of the surgeon, as compared with a blunt one. It is more efficient for good, if properly handled; it is more powerful for evil, if misused." How many general practitioners are really expert in the proper administration of chloroform? Ether, while safer than chloroform, is more disagreeable, frequently causing hypersecretion from the mucous membranes of the respiratory tract, nausea, emesis, depression, sometimes even "spasm of the glottis." We are speaking now of the use of anesthetics in minor operations which are either not sufficiently serious or whose results are not sufficiently important to outweigh the fact that the patient's life is put in greater or less jeopardy by the agents spoken of.

Nitrous oxid, as we shall endeavor to show, is practically harmless, or at least incomparably safer than either cocain, chloroform, or ether, and it is, moreover, not difficult of administration. True, its effects *are* transitory, but so are those of chloroform or ether; continuous anesthesia in either case being only secured by continuous administration.

Formerly the cumbersome apparatus required for the generation and administration of nitrous oxid did prove a consideration of some weight; but at the present time, when sufficient condensed or liquefied gas for from half a dozen to a dozen administrations can be obtained in portable iron cylinders, this objection, it must be admitted, cannot be urged as of great importance. Such cylinders should find their way into almost every physician's office; they both can and should be used in many minor operations.

When the physician or surgeon can alleviate pain or physical suffering, and not jeopardize either health or life, it is not only expedient, but even obligatory, that he should do so. The apprehension and imagination of an individual can and will frequently magnify the pain of a simple incision a thousand-fold, and thereby induce a condition of mental excitation which certainly is neither desirable nor beneficial. Where we possess simple and harmless means, it is our duty to relieve the induced mental anguish, as well as the actual physical pain. Nitrous oxid not only can be, but has been, used for such purposes, and its unflinching success certainly merits for it a more general use. It has been used, among others, under the following conditions: Dilatation of sphincters, lancing of felons and abscesses, injecting hydroceles, carcinoma of the lip, phimosis, compound and comminuted fractures, lithotripsy,

lithotomy, tracheotomy, amputation of the breast. In none of these can dissatisfaction or failure be recorded, as far as the anesthetic is concerned; on the contrary, not only was anesthesia satisfactorily maintained, but it was quickly produced, and after the operation its effects were quickly dissipated, without consequent nausea or other disagreeable symptoms.

Rapid production and rapid dissipation of anesthesia are marked when nitrous oxid is used. In the extensive series of experiments published by the Odontological Society of Great Britain, it was determined that, when the administration of the gas was pushed, complete anesthesia was produced in males in *eighty-seven seconds!* And that, after cessation of the administration of the anesthetic, consciousness supervened in one hundred and fifteen seconds, *or slightly less than two minutes!* Hence it is possible by the use of nitrous oxid to produce anesthesia, perform a minor operation, and fully restore consciousness *within five minutes.* What anesthetic known to modern science can parallel this?

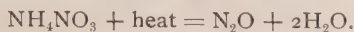
Now, there is a reason for these phenomena. Most general anesthetics are highly volatile liquids, and are introduced into the system by means of the respiratory tract; they must, therefore, first be vaporized. With some due allowance, the anesthetic activity or rapidity (if I may be allowed the use of such a term) of most anesthetics is largely in direct ratio to their respective rates of volatility. Now, nitrous oxid is naturally a gas; even the compressed or liquefied form, which exists by reason of the exercise of pressure, assumes the gaseous state *simultaneously* with the release of pressure. Therefore, it is instantly ready for introduction into the system, without necessitating the expenditure of a single second of time to effect an intermediate vaporization. Therefore, also, its effects are soonest manifested. Moreover, being a nerve-stimulant, the mental and physical faculties are stimulated to a return to their natural functions when the administration of the anesthetic has ceased, and consequently consciousness supervenes more rapidly. Again, nitrous oxid is much more soluble in the blood than either chloroform or ether; it is, therefore, taken into the system more rapidly and in greater quantity, hence its effects are manifested more rapidly. For the same reason its elimination is effected in a shorter period of time. It is more probable that the rapid production and the rapid dissipation of anesthesia are due to the greater solubility of the agent.

Nitrous-oxid gas was discovered in 1776 by Priestley, the English clergyman and scientist, who, however, elucidated but few of its properties. It was first brought into general notice in 1800 by Sir Humphry Davy, the famous English physicist and chemist, who first discovered and made known those peculiar and remarkable exhilarating properties which earned for it the name of "laughing gas."

Davy says, "As nitrous oxid, in its extensive operation, seems capable of destroying physical pain, it will probably be used with advantage during surgical operations in which no great effusion of blood takes place."

Strange as it may seem, this valuable suggestion and remarkable prediction remained unheeded for nearly half a century,—that is, as far as its practical application is concerned. In fact, the gas was largely regarded as merely one of those curious things which were more fit for lecture-room experiments than for practical application. Matters remained in this condition until December, 1844, when, in an adventurous spirit, Dr. Horace Wells, of Hartford, Connecticut, underwent an extraction of a tooth while rendered unconscious by means of nitrous oxid. So successful was this experiment that he attempted to establish the practice of inducing anesthesia by this means in dental surgery; but in consequence of an unfortunate failure in Boston he abandoned it forever. The use of nitrous oxid as an anesthetic was revived in 1863 by Dr. Colton, and has been in general employ ever since.

Nitrous oxid is never found free in nature. It may be prepared by the reduction of nitric acid, by treating copper with concentrated nitric acid, and by heating ammoniac nitrate. The gas produced by either of the first two methods is always contaminated with *nitric oxid* (NO), and is, therefore, unfit for use. The only process possessing any practical value is that in which ammoniac nitrate is decomposed by means of heat. The reaction is thus tersely expressed:



The operation is usually conducted in a retort or a Florence flask. To some portion of the delivery tube a condensing device is attached, whereby the aqueous vapor is separated from the gas by condensation. This device usually consists of a glass bottle or flask submerged in a cold bath.

All ammoniac compounds are more or less volatile under the influence of heat; therefore, if the heat is not carried rapidly up to such a degree as will decompose the nitrate, portions will be volatilized unchanged,—that is, sublimed. Decomposition is not accomplished—that is, gas is not evolved—until the temperature has reached about 460° F.; at 480° the gas is disengaged freely and rapidly. The temperature should not be carried beyond the latter point, because at 500° and above the exceedingly objectionable and dangerous gas, nitric oxide (NO) is also given off. After its disengagement the nitrous oxide is collected in a gasometer by “wet displacement,” the liquid over which it is collected being warm water, or, better, warm brine. The gas is quite soluble in water, 130 parts of the latter dissolving 100 parts of the former. It will therefore be absorbed until the liquid becomes “saturated” with the gas. Then, as the saturated liquid gradually gives up portions of its dissolved gas to the atmosphere it will draw upon that which is stored away to replenish the loss; this can be remedied to a certain extent by covering the water in the receiver with a thin film of some non-volatile oil.

Even with the greatest care the gas is likely to contain impurities, which must be removed before use. These are chiefly nitric oxide (NO), from the high temperature; chlorine (Cl), from the decomposition of ammoniac chloride (NH_4Cl), which is one of the most frequent impurities in ammoniac nitrate; ammonia gas (NH_3), and nitric acid (HNO_3), from improper regulation of the heat and a consequent improper decomposition of the nitrate. All of these substances in appreciable quantities are prejudicial to health, and hence *must* be removed before the gas is respirable. To this end the gas should be passed through a solution of ferrous sulfate (FeSO_4), commonly known as “copperas” (probably on the principle of *lucus a non lucendo*, because it contains no copper); then through a solution of potassic hydroxide, commonly known as “caustic potash”; and lastly through pure water. The “copperas” solution will remove any nitric oxide (NO) and also some of the nitric acid (HNO_3) present. If care be taken in the regulation of the heat—that is, if it be not allowed to reach the proximity of 500° —the “copperas” solution is really unnecessary. But if it be used, which is more advisable, we possess a safeguard against deleterious substances generated by carelessness or accident in the regulation of heat. The “potash” solution will remove any chlorine (Cl) or nitric acid (HNO_3) present; and the water, especially if slightly acidulated, will remove any ammonia gas (NH_3) present. Ammonia gas and nitric acid, however, are not common impurities, the commoner ones being chlorine and nitric oxide.

Nitrous oxide is a clear, colorless, gaseous body, possessing a sweetish odor and taste. It is 1.527 times heavier than air; as already stated, it is soluble in water; it is more soluble in alcohol. It is not very soluble in warm water and much less so in warm brine, and is easily liquefied by the application of cold or pressure. It will neither burn nor support life for any considerable length of time. It will, however, support *vigorous* combustion, but not feebly burning bodies; for instance, burning sulfur or a *feebly* glowing ember will be extinguished when immersed in the gas, but a vigorously burning stick of wood will burn even more actively or brilliantly in the gas. Bodies which have great chemical activity in combining with oxygen, such as phosphorus, burn very readily in this gas.

The characteristic feature of nitrous-oxide gas lies in its marked anesthetic properties; according to the amount ingested it induces intoxication, exhilaration, and finally complete insensibility. It is also said to possess slight tonic and diuretic properties, for the exhibition or production of which it is recommended either in substance or in aqueous solution. It is essentially a nerve-stimulant, like oxygen, but it has the advantage of influencing both the intellectual and the emotional natures. It is now considered a perfectly safe anesthetic, the mortality from its use being almost *nil*.

Chemically, nitrous oxide resembles oxygen more nearly than any other substance, although its compound nature naturally prevents very great chemical activity. In fact, this is the substance widely advertised by quacks under the

name "compound oxygen." We can probably contrast the differences between oxygen and nitrous oxid best by placing them in tabular form :

	NITROUS OXID.	OXYGEN.
Odor	Sweetish.	None.
Taste	Sweetish.	None.
Solubility in water	10 parts dissolved in 13 of water.	Slight.
Effect on combustion	Supports only <i>vigorous</i> combustion.	Supports <i>all</i> combustion.
Nitric Oxid (NO)	No effect.	Red fumes of NO ₂ .

Of course, by far the greatest and almost only therapeutic application of nitrous oxid is as an anesthetic. Nevertheless, it has been recommended as very efficacious in the treatment of such disorders as mania, dementia, melancholia, neuralgia, sciatica, insomnia, hypochondria, hysteria, asthma, some forms of functional heart-trouble, and also for all of the disagreeable symptoms that follow in the train of the morphin and tobacco habits. Its use, diluted with air, in the treatment of certain forms of atonic nervous disease, is highly indorsed by Allen McLane Hamilton. It is also recommended by Ziegler as a stimulant in chloroform poisoning, in poisoning by carbon dioxid, carburetted hydrogen, hydrocyanic acid, and also in suspended animation from any cause. However well sustained Ziegler's claims may be, the use of oxygen would be infinitely superior under the conditions enumerated. For internal administration the gas is given by inhalation or in aqueous solution, either by the mouth or by the rectum.

However rosy and bright these claims may be, they have been disputed. Several investigators have searched diligently for evidence to warrant the placing of nitrous oxid in the already overburdened armamentarium of *materia medica*; but most of these have been forced to the conviction that such efforts were useless. The result has been fitly expressed by Birdsall; * he tried the new aspirant in migraine, persistent headache, the muscular pains of influenza, paralysis agitans, asthma with chronic bronchitis, insomnia, melancholia with organic cardiac disease, the opium habit, hypochondriasis, neurasthenia, mental depression resulting from alcoholic indulgence, chronic bronchitis, and hysteria. In not a single instance did benefit follow,—in fact, he expressed himself thus : "My own view, based on the physiological and clinical data which I have been able to collect up to the present time, is that the uses of nitrous monoxid for medical and surgical purposes are restricted to its effects as an anesthetic and a *placebo*." Clinical experience seems to force us to the belief that internal medicine can hope to find no special merits in this substance.

To the majority of physicians nitrous oxid is known only as a general anesthetic; it can also be used as a local anesthetic. As supplied, compressed and liquefied, it is convenient for the production of either form of anesthesia. On release of pressure the liquid nitrous oxid immediately assumes the gaseous form, and in doing so "absorbs heat" from surrounding objects, or, as is sometimes said, "renders heat latent." If a spray is allowed to play upon a part, it will produce local anesthesia of the part, just as in the case of the ether-spray or prolonged contact with ice; this anesthesia, although produced in a manner similar to that obtained by use of the two last-named agents, is probably slightly more advantageous.

When first inhaled, nitrous oxid is said to cause an acceleration of the pulse, which soon gives way to depression. In my opinion, this temporary acceleration is largely due to the excitement under which the patient naturally labors and which is soon overcome by the depressing action of the gas. If the pure gas be inhaled, insensibility is usually produced in from half a minute to three minutes; when insensibility becomes complete, there is accompanying deep cyanosis, caused by venous stasis, and also stertorous breathing. This cyanosis is striking and alarming to one witnessing it for the first time; it is indicative of cardiac depression.

* *New York Medical Journal*, March 7, 1891.

Anesthesia is most probably caused by a combination of three factors, namely, asphyxia, cell-paralysis, and cell-coagulation. In asphyxia the blood lacks sufficient oxygen to carry on the normal functions of oxidation; this condition can be induced by any agent capable of cutting off the supply of oxygen to the blood. That nitrous oxide does cause such a condition is shown by the following events: 1. Cardiac and *pulmonic* depression; 2. Cyanosis; 3. The symptoms of asphyxia do not supervene when about twenty per cent. of oxygen is added to the nitrous oxide, *neither is anesthesia produced*; 4. Animals immersed in nitrous oxide die of asphyxia,* with all of the symptoms caused by immersion in nitrogen; 5. The blood in nitrous-oxide narcosis shows a marked deficiency of oxygen, the spectroscope revealing the presence of *reduced* hemoglobin; 6. Animals immersed in nitrous oxide live no longer than when immersed in nitrogen.

The fact that anesthesia is dependent to some extent upon the production of asphyxia is shown by the facts that—

1. Insensibility does not supervene until the proportion of oxygen in the blood is reduced to three or four per cent.; 2. Anesthesia is not produced if appreciable quantities of oxygen be mixed with the nitrous oxide; 3. Complete anesthesia does not occur until the blood becomes very dark; 4. Nitrogen is capable of producing the same phenomena as nitrous oxide;† 5. The blood during the stage of narcosis shows the presence of *reduced* hemoglobin.

It must be accepted, then, that asphyxia is induced and that it is at least one factor in the production of anesthesia, and the most important one at that; for the other causes are really effects of nitrous-oxide asphyxia. As a result of this condition, the supply of oxygen to the nerve-centers is cut off, and their nutrition and functional activity thereby suffers.

Nitrous oxide is a nerve-stimulant; its action upon the impaired nerve-centers probably produces cell-paralysis by over-stimulation, but asphyxia places the cell in the condition in which the over-stimulation is enabled to produce such effect.

Cell-coagulation is probably due to a combination of both of the foregoing causes, namely, asphyxia and over-stimulation. If the transmission of sensations, pains, or motor influences is a matter of molecular motion or activity, we can readily see how coagulation can impair or overcome entirely such transmissions by either retardation or cessation of molecular activity.

Asphyxia and its phenomena are dependent upon the altered condition of the blood. As the brain contains a relatively large amount of blood, if anesthesia depends to any extent upon asphyxia its effects upon the brain should be among the first exhibited. In fact, the cortical functions are most readily disturbed by any impairment of the phenomena of oxygenation, and the first and most striking effects of nitrous oxide are shown in disturbed cerebral action and impairment of the higher cerebral functions. Dr. Underwood claims that under the influence of the anesthetic there is a progressive paralysis of:

1. The cerebrum, in consequence of which volition is destroyed.
2. The sensory centers of the cord; motion becomes erratic; sensory stimuli are not responded to.
3. The motor centers of the cord, as a result of which motion is destroyed.
4. The motor and sensory centers of the medulla oblongata, after which respiration, the heart's action, and all the functions of life cease and death supervenes.

The chief danger lies in cessation of respiration and circulation; it is more important, however, to watch the respiration, for the heart flags last. Notwithstanding all this, nitrous oxide is extremely safe, for long before life is actually menaced, ample warning is given by many obvious danger-signals. Moreover, it is never desirable to push the anesthetic beyond the production of stertor and cyanosis. Any such dangerous symptoms as may arise are readily amenable to the administration of oxygen, artificial respiration, and stimulation of the heart and lungs.

* *British Journal of Dental Science*, xxv, 725. *Philadelphia Medical Times*, Nov. 15, 1873.

† *Archives de Physiologie*, July, 1873.

Statistics give the number of deaths under chloroform as one in three thousand, or thirty-three thousandths of one per cent. (0.033 per cent.); while the deaths under ether are given as one in twenty thousand, or five thousandths of one per cent. (0.005 per cent.). At the Tenth International Medical Congress held in Berlin in 1890, it was stated that fully seven hundred and fifty thousand persons annually took nitrous oxid *in the United States alone*. Making on this basis an "average" calculation, between ten and eleven million people have taken the gas in this country since its reintroduction by Dr. Colton. In that time only six cases of death attributed to nitrous oxid have been reported in the United States; and of these, four have been eliminated as being in no way caused by the gas. Of the remaining two deaths, one occurred in 1864, just one year after the reintroduction of the use of nitrous oxid, when its nature, effect, impurities, and methods of their removal were not fully understood. The patient *fully* recovered from the effects of the gas, walked into an adjoining room apparently well, returned, complained of pain and dyspnea, sank upon a sofa, and expired in a few minutes. The coroner's verdict was death from congestion of the lungs induced by inhalation of nitrous-oxid gas. The latter half of this verdict is ridiculous; in the first place, consciousness supervenes rapidly, and when consciousness has been restored the patient is in no danger from the gas; in the second place, the patient had fully recovered from the effects *of the gas*; the unpleasant symptoms described were not due to it, but to some irritant *impurity*, undoubtedly either chlorin or *nitric* oxid. If the man died from congestion, it was induced by this impurity and not by the gas. The other case occurred in a dentist's office in Chicago two or three days before the great fire; on account of the confusion caused thereby the death became known to few and was soon forgotten. Of the particulars we know nothing, so that really there is no sound evidence upon which to charge even these two deaths to nitrous oxid; on that basis the mortality in this country would be *nil*. However, assuming the burden of these two deaths, its mortality would be represented as two in ten million five hundred thousand, or two-hundred-thousandths of one per cent. (0.00002 per cent.!) At this rate it is two hundred and fifty times safer than ether, and one thousand six hundred and fifty times safer than chloroform! And yet it is being constantly used by those of all shades of experience, from the tyro to the "expert"; many who would refuse to use either chloroform or ether do not hesitate to administer nitrous oxid; there are many who use it who know nothing of it. No anesthetic is handled so recklessly and ruthlessly, and yet no anesthetic can parallel its marvelously low record of death. If other anesthetics were placed under like conditions, their mortalities would be multiplied a hundred-fold. Does it not, then, seem strange that with its few inconveniences and its incomparable advantages this agent is not more largely used?—*C. M. Buchanan, M.D., in Medical News.*

CASE OF ACUTE PERIOSTITIS OF THE JAW FROM MERCURIAL POISONING.—*Medical report by Mr. Staveley.*—Mrs. K., widow, aged thirty-one, had had fairly good general health until recently. She had had a good deal of worry from legal matters in connection with her late husband's affairs. She had suffered occasionally from muscular rheumatism.

She consulted me for the first time on December 23, 1892, complaining of general nervousness, tremors of the hands, inability to sleep, and almost complete want of appetite. She attributed her condition to two boils which had formed on the right arm. One of these was well, the other had been incised and was healing. She also had some facial neuralgia. The catamenia appeared regularly every three weeks. The bowels acted twice daily. She was a tall, spare woman. There was marked pallor of the face, but not much anemia of the mucous membranes. The tongue was thickly coated and the breath offensive. Teeth had been recently filled, and she was in the habit of visiting her dentist every six months.

I attributed her condition to insufficient food, and prescribed a generous diet and the following mixture: Ferr. et quin. cit. gr. x, tinct. nuc. vom. $\mathfrak{m}\mathfrak{x}$, aq. chloroform. $\mathfrak{z}\mathfrak{j}$, t. d. s.

On December 26 she sent for me, as the neuralgia had been very severe. The breath was very offensive, the gums swollen, and there was much creamy

fur about the teeth. I advised her to visit her dentist if the pain did not subside, and prescribed pulv. phenacetin, gr. v, to be repeated in half an hour's time if necessary.

On December 27 I received a note from Mr. R. Denison Pedley at 8 P.M., saying that the patient had been to see him and that he had extracted two teeth to relieve pain. He suggested that the condition of the mouth was due to some poison, probably septic. I saw Mrs. K. the same evening, and found the teeth on the right side of the mouth all loose, pus welling up from the sockets; the breath was most offensive, and there was a profuse flow of saliva. The temperature was 100°.

On December 28 she was somewhat relieved; the temperature was 99°. A chlorin mouth-wash was ordered to be used frequently.

On January 2, 1893, there was still much discharge, and great pain in the second (?) lower molar; pus was still welling up from the tooth-sockets. At 5 P.M. I met Mr. Pedley in consultation. She was then free from pain, and we decided to wait. We discussed the question of poison for some time, but could discover no source. We were both much perplexed as to the cause. She continued under my treatment until the end of January. Abscesses formed at the roots of two other teeth, with great pain, necessitating their removal. All the teeth extracted were carefully examined, and the pulps found to be healthy.

On February 4 the patient's sister informed me for the first time that the patient had been using a lotion for her complexion since the beginning of October, 1892, and left a bottle of it at my house. On examining it I found it contained mercury, apparently in large quantities. I did not attempt to estimate it quantitatively. I left this bottle at the office of the British Medical Association on February 14, 1893.

Dental report by Mr. Pedley.—The following is the dental report from notes taken at the time or the day after:

December 27, 1892. Mrs. K., aged about thirty, came to-day with her sister about 4 P.M. Complains of constant pain in upper and lower jaw on the right side; has kept her awake at night for nearly a week. Says she hardly knows how to bear the pain; it is acute and throbbing. On examination, patient can scarcely open her mouth. The breath is very offensive. From the mid line in upper and lower jaws on right side, as far as the wisdom-teeth, the gums are inflamed and thickened. The teeth are all loose, and on pressing the gum, pus oozes out round the necks of the teeth. The molar teeth in upper and lower jaw on right side are acutely sensitive when pressed upon. Patient fainted twice during the examination. Decided to remove a molar tooth in upper and lower jaw on right side, the most sensitive. Nitrous oxid administered. Upper twelfth-year molar and lower wisdom-tooth removed on the right side. Patient seemed much relieved. Teeth not carious. Teeth carefully examined after extraction. The upper molar had been previously stopped on the posterior surface, but there was no reason for supposing that the nerve-pulp was irritated. The periosteum was much inflamed and thickened. On cutting the teeth open the pulps were healthy in appearance.

December 29, 1892. The father of Mrs. K. came to-day and asked if I would visit Mrs. K., as she was too ill to come out. Went at 3 P.M. Mouth in same condition as before, but much relieved by extraction. Looks very ill, and seems very weak.

January 23, 1893. Mrs. K. came this afternoon. Inflammation of upper and lower jaw seems to have spread to the left side. The teeth are sensitive and loose. A lower bicuspid tooth on left side acutely sensitive, and, although not carious, the patient complains of constant pain. Nitrous oxid administered; tooth extracted. Periosteum very much thickened and deeply congested. On cutting it open, the nerve-pulp was apparently quite healthy.

January 25, 1893. Mrs. K. came this afternoon. Pus still oozing out round necks of teeth; there is a slight improvement; breath still offensive. Right lower molar acutely sensitive and very loose; extracted under gas. Periosteum inflamed and thickened; nerve-pulp seems quite healthy. Patient complains of great pain, but can open her mouth a little wider.

February 17, 1893. Mrs. K. came to-day. Mouth healthy; no pain; breath sweet; teeth much tighter; took models of upper and lower jaw.

Remarks.—Mrs. K. has periodically consulted me with regard to her teeth

during the past two years. I have always regarded her as a healthy woman with a healthy mouth. The symptoms point to a general inflammation of the jaws, in which the teeth were secondarily affected. The teeth were extracted as the readiest means of relieving tension, and by doing so the patient has been probably saved from necrosis of the jaws. The sudden onset, the condition of the mouth, gums, and teeth, the fætor of breath, the whole history, in fact, points clearly to poisoning by mercury, and that I believe it to be. During the past fourteen years I have seen many cases, both in hospital and private practice, but in all my experience I have never seen a patient suffer such intolerable and persistent pain.

The following is the patient's statement: During the early part of October, 1892, I went to Mme. Anna Ruppert, in Regent street, my complexion not being good; otherwise I was in good health. She looked at my face with a magnifying glass, and said that her preparation would remove spots. She recommended me to try her special treatment. Next morning she sent me by parcel post three bottles of lotion, three cakes of soap, one pot of ointment, one box of powder, for which I paid two guineas. The interview lasted about five minutes. About a month after I had been to her I began to be sleepless, lost my appetite, my hands became so tremulous that several of my friends noticed it. I was formerly much constipated, but the bowels now acted about twice a day. Two boils formed on my right arm about the beginning of December. I rubbed some of the ointment on a scratch on my arm; boils immediately followed. On December 23 I went to consult Mr. Staveley. Except for being run down and in bad health, he did not know what was the matter with me. I complained to him of what I thought was neuralgia in the right side of my face and head; this got worse and worse, and I suffered agonies in my mouth. Inflammation set up, and on December 27 I went to Mr. Pedley. He extracted one tooth from the upper jaw and one from the lower. He could not account for the state of my mouth, but thought I had been poisoned. On two occasions I fainted, once when I went to Mr. Pedley. All my teeth were loose for some time, and the pain was intense. The flow of saliva was so bad that I could not swallow it. I was in my room for four or five weeks, and getting better, but had another attack of violent pain. I had another tooth out on January 23, 1893. On the 25th or 26th the fourth and last was extracted. I may add that there was constant discharge from the gums, and I was unable to eat solid food for several weeks.

Remarks by Mr. Staveley.—I am of opinion that the case was one of mercurial poisoning, and that it was only by relieving tension, by removing the teeth, that the patient escaped necrosis of the jaw. I have failed to discover any other way that the patient could have absorbed mercury except by the lotion. I feel convinced that the lotion was the cause of the illness.—*W. H. C. Staveley and R. Denison Pedley, in Brit. Med. Journ.*

A COMPARISON OF SOME MEDICINAL BRANDS OF HYDROGEN PEROXID.—The brands examined were Béné, Peuchot, Marchand, and Oakland Chemical Company. Each was claimed to be chemically pure and of fifteen volumes strength. All were obtained directly from the manufacturers, and, though some were several weeks old, they were in unbroken packages, and remained sealed until the moment of the estimation of oxygen. Mr. Peuchot learned that the analysis was being made, and sent a special sample which he claimed would be an improvement on his former productions. This, in the table, is designated as Peuchot No. 2.

The volume of oxygen was estimated by the method of F. X. Moerk. A solution of potassium permanganate, 2.625 grams to the liter of water, was prepared. About two liters of water was acidified with five cubic centimeters of dilute sulfuric acid, and exactly five cubic centimeters of the hydrogen-peroxid solution added. The potassium-permanganate solution was then poured in gradually until it ceased to be decolorized, and the number of cubic centimeters added, divided by ten, represents the volume of oxygen.

In the results for volume, that sample which was examined again after being opened is marked with the small letter (a).

The acidity was reckoned by using a solution of ten milligrams of potassium hydrate in one cubic centimeter of water, with phenolphthalein as indi-

cator. Ten cubic centimeters of the sample was tested in each case, the figures in the table representing the average of results.

Fifty cubic centimeters were evaporated at a low heat to dryness, and both residue and the original sample tested for chlorid, sulfate, phosphate, fluorid, borate, barium, and other metals by the usual processes of the laboratory. Sodium and potassium were recognized by the Bunsen flame.

Each sample underwent the same treatment, and attention may be called to the fact that, however widely these results differ from results of other investigators, they are, as they claim to be, *comparisons*. The same weights, measures, and solutions were used in every instance, in order to guarantee uniformity.

Generally more than one bottle of a brand was examined, and the volume of oxygen was found to vary considerably, no doubt dependent largely on age. Of the Peuchot brand, it is claimed, however, it "can be left open and exposed to the air without losing strength."

	Specific Gravity.	Volume of Oxygen.	Volume of Oxygen after having been opened at least 24 hours.	Acidity. Milligrams of KOH for 10 cc.	Residue in 50 cc. Milligrams.	Sulfuric acid or Sulfate.	Metals.	Other matter.
O. C.....	1.0119	a13.5—12.0	a13.0	6.45	30.0	trace	Sodium	present
Marchand	1.0116	13.5—a10.4	10.3—a10.0	25.16	50.6	present	Sodium	boric acid
Béné.....	1.0110	10.5—a9.8	a9.45	6.83	60.0	present	Sodium Potassium	none
Peuchot No. 2..	1.0120	11.76	—	7.20	150.0	trace	Calcium Sodium Potassium (trace)	glycerol
Peuchot No. 1..	1.0136	12.5—a6.1	a4.05	9.85	320.0	present	Sodium	present

All the samples contained HCl or chlorid, and phosphoric acid or phosphate (Béné merely a trace); but were free from barium, except P. No. 1, which contained a trace.

In the residue from Marchand's solution no chlorid could be found; the solution, however, evidently contained hydrochloric acid, which must have been driven off during evaporation, the excess of sulfuric acid preventing the formation of chlorids.

The residues from Peuchot's and O. C.'s solutions were not again entirely soluble in water, alcohol, ammonia, or cold hydrochloric acid. In Peuchot No. 2 this insoluble matter was calcium phosphate.—*R. Louis Lloyd, A.B., in Amer. Journ. of Pharmacy.*

PHENATE OR CARBOLATE OF COCAIN AS A LOCAL ANESTHETIC.—The need of a good local anesthetic from which there is no danger of oversystemic action has long been felt by the medical profession.

Probably no better drug than the muriate of cocain has been produced, but it is open to the one serious objection that when applied to cut surfaces it produces dangerous systemic action, endangering the life of the patient, and in a limited number of cases causing death.

Believing the combination of carbolic acid and cocain to be an excellent one theoretically, from the fact of both possessing anesthetic properties, and the former one of the best-known antiseptics, the writer decided to test the practical use of the drug.

The phenate of cocain is one of the many preparations by Merck. It is described as a slightly colored substance, of the consistence of thick honey, which readily melts when heated, and containing seventy-five per cent. of the cocain alkaloid.

It is soluble in alcohol of from thirty to fifty per cent., the solution having a faint odor of carbolic acid.

The dose of the drug is from one-twelfth to one-sixth grain, repeated every four hours. Locally, it is applied in solutions varying from one to ten per cent.

How much the antiseptic properties of the carbolic acid are affected by the chemical combination we leave open for discussion; suffice to say that the solution was applied to cut surfaces in which no other antiseptic was used, and in all cases the results were equally as good as in those where such solutions as peroxid of hydrogen or carbolized benzoninol were used.

In testing its anesthetic properties, ten different solutions were used, ranging in strength from one to ten per cent., the six and eight per cent. solutions answering as well for all operations as the nine and ten. The applications were limited to the nasal and pharyngeal mucous membrane.

For thermo-cautery application in follicular or granular pharyngitis, where the burning is superficial, the two to four per cent. solution gave equally as good results as the higher ones. The one and two per cent. solutions were not satisfactory; for prolonged operations and those involving deeper tissue the stronger solutions must be used.

The length of time to produce anesthesia is somewhat longer than that required for the muriate; but, when once produced, it is more lasting. In twenty-four cases the average time was seven minutes, the total number of applications at different sittings being one hundred and fifty.

In comparing the phenate with the muriate of cocain, I believe it to be as good a local anesthetic, and in none of the one hundred and fifty applications of which I kept record, and I feel safe in saying as many more of which I kept no record, did I have symptoms of cocain-poisoning, nor did the patient complain of any bad after-effect.

Yet in three cases there was cardiac disease and in one albuminuria. These conditions are known to be especial contraindications for the use of the muriate.

As an antiseptic, I believe it equal to any carbolized solution usually used in nasal operations.

It can be safely used on cut surfaces, which, in using the muriate, is to be carefully avoided.

It is superior to the muriate in the fact "that it coagulates the albumin in the tissue, preventing the absorption of the cocain, thereby prolonging the anesthetic effect, and lessening the danger of systemic poisoning" (Hare).

Dr. Isador Gluck has for several years added carbolic acid to solution of muriate of cocain for the purpose of avoiding the after poisonous effect.

Dr. Roberts Bartholow also states that phenol added to muriate of cocain will lessen the danger of systemic poisoning.

Dr. Von Oefeles uses the drug exclusively in the place of the muriate, locally, internally, hypodermically, and in powder.

For operations involving the deeper tissue, the drug must be used hypodermically, the eight per cent. solution usually producing sufficient anesthesia. The alcoholic solutions give better results, but are more irritating.

While we must not draw too positive conclusions from these few cases reported, yet the results are such as to justify its use in minor surgery.—*D. B. Kyle, M.D., in Therapeutic Gazette.*

PENTAL AS AN ANESTHETIC.—This drug, which since the year 1856 has had a limited use as an anesthetic, has recently been warmly recommended, because of certain advantages which it seemed to possess over both chloroform and ether. But a small quantity (for a period of half an hour, from half an ounce to an ounce and a half) is required to anesthetize; the full effect is produced in less than two minutes, the period of excitement is very brief, there is little or no interference with the respiratory functions, the effects of the drug rapidly pass off, and, as a rule, neither headaches, vomiting, nor any other disagreeable symptoms follow. Anesthesia may be obtained without loss of consciousness or pupil reflex.

Though this drug possesses marked advantages, the fact that it has produced one death in a limited number of administrations (one thousand) has prevented conservative surgeons from giving it a trial, though the fact was clearly recognized that the single fatality might have occurred quite inde-

pendently of any lethal influence of pental. Recently, however, there has appeared a research by Kleindienst, which, if corroborated by others, should definitely settle the position of pental as an anesthetic. Kleindienst found in a large percentage of cases (eight out of twenty-five) that the administration of this drug was followed by the appearance of albumin in the urine, supplemented by blood and casts in some cases.

With this record against the pental (one death in one thousand administrations and involvement of the kidneys in thirty-three per cent. of cases), we must look to Germany for corroboration or disproof of the statements of Kleindienst, since human life is regarded by the English and American surgeons as too valuable to risk in such a research.—*Therapeutic Gazette*.

WHAT IS EUCALYPTUS OIL?—It is not always easy to say from what species a eucalyptus oil may be derived if we judge from its chemical properties alone. Roughly, commercial oils are divided into three classes,—that from *Eucalyptus globulus*, that from *E. cucurifolia*, and that from *E. amygdalina*,—but a note by Mr. J. H. Maiden, of Sydney, in the *Druggists' Bulletin*, states that so far as some Victorian oil is concerned, the species employed are quite different. In the Bendigo district the leaves of *E. sideroxylon* alone are used for distilling the best oil, and "bulk oil," which is sent to Melbourne for redistillation, is obtained from the *E. leucoxylon* (the "blue gum" of that district,—*E. globulus* is the "blue gum" of Tasmania), *E. melliodora*, and *E. polyanthema*. In a tract of country bounded by the townships of Raymond, Epsom, and Kamerooka, there is a scrub, and here the narrow-leaved *E. gracilis* leaves are largely gathered by woodmen, packed in sacks, and sent to the oil-makers in Sandhurst. When all the conditions under which the leaves are collected are considered, it is not surprising that the oil frequently varies so greatly.—*Chemist and Druggist*.

TRICHLORACETIC ACID.—As a *caustic*, trichloroacetic acid is a valuable, convenient, and easily manageable remedy.

Wipe the affected part *dry*; dip the tip of an aluminum, gold, or wooden probe—*naked* if the affected surface be *small*—in a saturated solution of the acid, and touch the parts with the charged tip, and soon as the medicated surface begins to turn *white*, again wipe the part *dry*,—if indeed it is not already dry, as it often is, from the effect of the medication. The saturated solution of trichloroacetic acid is not so diffusible as nitric or chromic acid, and, therefore, more easily manageable, and its application is much less painful than other chemical caustics, or the thermo-cautery. It is well suited for killing naso-pharyngeal and other neoplastic and fungous growths and hypertrophies, as those of the vagina, uterine cervix, venereal warts, pile tumors, and polypos growths.

Before applying the acid, as a *caustic*, to very sensitive parts, it is well to cocaineize the part for a few minutes before the acid is applied.

I have been using trichloroacetic acid for the purposes mentioned for about two years, and find it a very convenient and effective remedy.—*Dr. Q. C. Smith, in Jour. Amer. Medical Assoc.*

HINTS, QUERIES, AND COMMENTS.

HOTEL ACCOMMODATIONS DURING THE CONGRESS AND BEFORE IT CONVENES.—The best way to secure accommodations will be to write to Mr. R. C. Brophy, manager of the Information Bureau of the Columbia Dental Club, 300 Michigan avenue, Chicago, Ill., who will secure accommodations in any part of Chicago or the suburbs at prices to suit the most moderate purse. Mr. Brophy has a list of more than one thousand rooms less than a mile from the Art Palace, at very low prices. He will undertake to secure for you just what is wanted. Do not hesitate to say how much or how little you desire to pay, whether with or without meals. By securing rooms now much money will

be saved, as in August there will be large numbers of visitors to the Fair, and prices for rooms will be in greater demand at higher rates.—*Dental Review*.

MAGNESIUM HYDRATE IN EROSION CASES.—A method for locally counteracting the injurious action of acid secretions, especially in erosion cases, and which has given me greater satisfaction than any means which I have hitherto employed, is by the use of a preparation known to the drug trade as Phillip's Milk of Magnesia, which consists of precipitated magnesium hydrate held in suspension in water. It is to be applied in the same way that lime-water or precipitated chalk is used for the purpose of bringing about an alkaline condition of the oral fluids, by neutralizing the excess of acids present. A teaspoonful of the preparation taken into the mouth and allowed to float around over the teeth coats them with a slight film of alkaline magnesium hydrate, which is sufficiently adherent to protect the tooth-surfaces from the acid action for a number of hours. I have tested the reaction of the saliva three hours subsequent to the application, and found it still markedly alkaline. It is probably sufficient to prescribe its use three times daily, after meals, though when used night and morning the action is markedly beneficial in retarding erosion. Its advantage over soda bicarb., chalk, or lime-water is because of its continued action over a considerable time and the film-like alkaline coating which it forms upon the surfaces of the teeth.—EDWARD C. KIRK.

DEATH FOLLOWING NITROUS-OXID INHALATION.—The *Erie Morning Dispatch*, June 7, 1893, reports a fatality in connection with inhalation of nitrous oxid for the operation of tooth-extraction, which occurred in the office of Dr. G. J. Mead, of Erie. The sister-in-law of Dr. Mead was the patient. She desired the extraction of two teeth which were causing pain. Ordinary nitrous oxid was administered, and the teeth were removed without difficulty. The patient seemed to recover from the effects of the anesthetic, rising from the operating-chair, going over to a chair by the window, and then returning unassisted to the cuspidore twice to rinse her mouth of blood. The operator had left the office, and was in an adjoining room when he heard the patient cry, "Oh, my head!" Hastening to the operating-room, he at once saw that her condition was alarming, her breathing being heavy and her eyes, though open, having a leaden appearance. There were present in the room beside the patient, her husband, her sister, the operator, and the operator's son. The latter was hastily dispatched for medical aid. In the mean time Dr. Mead applied such restoratives as were at hand. It was but a few minutes after the unusual symptoms were noticed that three physicians were in the office, making every effort to restore consciousness. All efforts proved futile, however, and death occurred from œdema of the lungs. Nothing, so far as can be known, indicates that the unfortunate affair might have been avoided. The patient had on two or three previous occasions taken the gas without apparent ill effects. The symptoms seemed to point to apoplexy. Her family physician, it is said, had expressed the opinion that she was likely to be suddenly stricken at any time, and the fact that she had to all appearances recovered from the effects of the gas might indicate that her death was occasioned by natural causes.

THE COLUMBIA DENTAL CLUB was opened Saturday evening, May 20, at 300 Michigan avenue, Chicago, Ill. There were about one hundred present. There are sixteen rooms in the house devoted to club purposes, and a café has been opened. After June 15, there will be an "Information Bureau."

Dentists can have letters addressed in care of the club. It is hoped that many dentists not now enrolled as members will send their names to the secretary, J. W. Wassall, 208 Dearborn avenue, Chicago.—*Dental Review*.

STRONG COFFEE AS AN ANTIDOTE FOR COCAIN-POISONING—A married lady, age about thirty, called to have a tooth extracted. It had been giving her considerable pain from pericemental inflammation. I injected cocain solution on each side of the tooth, and extracted it. About ten minutes afterward she said she "felt queer all over," that her "feet and limbs were going to sleep." I had her lie down, and administered brandy and water without seeming to better her condition. Fluctuations and throbbing of the heart commenced, with retarded pulse. Having some ground coffee on hand, I made a strong solution by boiling, and gave it by the spoonful. As soon as the coffee had assimilated, she commenced to feel better; the throbbing ceased, the pulse grew stronger, and she soon recovered from the effects of the poison. I have since stopped using so powerful a drug.—J. H. KENNICOTT, D.D.S., Chicago, Ill.

QUACKERY IN PRUSSIA.—The Prussian government prosecutes the vending of nostrums and quackery with inexorable severity. The advertisements of miraculous medicines have nearly entirely disappeared from the Prussian newspapers. The police furnish to all editors a list of those nostrums which are excluded from public announcement. During the three years from 1889 to 1891 there occurred three hundred and twenty-six verdicts whereby newspaper editors were punished for having accepted such advertisements as were "on the list." Beside that, one hundred persons were sentenced for having illegally sold secret medicines.

The list of nostrums whose public advertisement is prohibited by law according to the decision of the board of health (medical council), comprises already about two hundred and thirty preparations.

THE AMERICAN MEDICAL ASSOCIATION has a section on dental and oral surgery, but the British Dental Association has no representation in the British Medical Association. Once there was an association of medical men practicing dentistry in London, but it is now defunct. All organized dentistry in Great Britain is organized on the independent basis, there being no alliance with medicine officially.—*Dental Review*.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

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The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED FROM MAY 23 TO JUNE 6, 1893.

- May 23.—No. 497,905, to GERARD BEEKMAN. Flexible shafting.
 " " No. 497,904, to FRANK B. NORRIS. Dental hot-air syringe.
 May 30.—No. 498,554, to OLOF JOHANSON. Dental broach.
 June 6.—No. 499,015, to JAMES H. DOWNIE. Dental furnace.

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ORIGINAL COMMUNICATIONS.

THE ARCHITECTURE OF THE FACE.

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IN the continuance of our studies of the face, after having taken a general view of its psychical, zoological, and ethnological relations, we come now to the analysis of the face proper, with the purpose of the diagnosis and differentiation of its mechanical and artistic elements, especially as these depend upon or are modified by the teeth or their supporting environments.

Preliminary to a special study of the mechanical construction of the face, we must notice first the anatomical relations of the facial region to the rest of the general structure. In accordance with the law of the interdependence of parts, the face is intimately related to and depends upon the remainder of the organism, and in turn yields its quota of service to the whole economy. As the brain-case (Harrison Allen) is made for the reception and protection of the brain, so the face has its special duty as the matrix of the special senses and of the teeth. Although the facial region of man is rudimentary, and is dwarfed by the towering brain, it is still so far perfect and complete that it fulfills special and important duties. Important organs are located within this region which exercise great influence upon the economy by performing indispensable services. These duties are the support of three or four of the special senses, and of the masticating apparatus for the reduction of food preparatory to its introduction into the alimentary canal. Incidentally, the face is the principal seat of the expression of the emotions in man, and assists articulate speech in the communication of ideas.

Man being a vertebrate, we observe that "A vertebrate is an animal (Bradley, "Compar. Anat.") with a backbone or vertebral column, which is composed of segments, or vertebræ, strongly connected together. This strong column is the mainstay, the basis, of the entire skeleton in such an animal. The other portions of the skeleton are anchored to and dependent upon this column; the limbs are suspended from it, and the head is poised upon it.

"From the vertebral column proper, two arches spring, comprising the axial skeleton. The first, the smaller, is placed above the vertebral column, and is composed of the apophyses of vertebræ, which is called the *neural arch*, because it incloses and protects the nervous system, the spinal cord, and brain. The second is the larger arch; it lies below the vertebral column and is composed of the ribs which are attached to the vertebræ and the abdominal walls, and is called the *visceral arch*, because it incloses the viscera. The trunk and head of a vertebrate body are composed of segments serially arranged, and these arches are carried forward in the construction of the head of vertebrate animals, the cranium being distinctly composed of vertebrate arches; but the comparative size of the arches is reversed. In man this is very marked, as the neural arches of the cranial vertebræ are greatly expanded to accommodate the larger quantity of nerve-substance. The segments of the skull nearest the spine are clearly made up of modified vertebræ, but as we advance farther the resemblances are not quite so distinct, although the homologies of the segments are positively maintained and exact, the bones of the skull belonging to the neural arches and the facial skeleton to the visceral arches of the typical vertebrate."

There are properly four vertebræ composing the cranial skeleton, and each segment lodges a distinct portion of the substance of the brain,—*i.e.*, first the occipital, second the parietal, third the frontal, and fourth the nasal. At the base of the skull is placed the occipital, resting on the vertebral column; then follow in order the parietal and frontal, all being articulated firmly together to compose the brain-case,—the nasal segment not inclosing any brain-substance proper. In man these latter are much reduced, even atrophied; but in most lower animals the nasal arches are large and conspicuous members of the neural series. As Professor Zeigler has said, "By the vertebrate theory of the skull is meant that the skull consists fundamentally of a series of transverse segments, which resemble in their main features, or are homologous with, the component parts of the vertebral column. The skull is made up of modified vertebræ, being composed of a series of pieces corresponding with those of the neck or back."

"This idea occurred first to the philosophic as well as poetic Goethe, was formally propounded by Oken, was further laboriously worked out by Owen, and elaborated by others, and commends itself to all anatomists. It has recently, however, been opposed by Professor Huxley, who admits the segmented disposition of the skull, but denies the vertebral theory."

"But I think that you can scarcely examine with any care a number of skulls of man and lower animals in the foetal state, before the bones have become ankylosed together, without having the conviction forced upon you that they are constructed upon the vertebral type. In the embryo the proto-vertebral substance extends the whole length of the organism, from the nasal to the caudal end, and incloses three canals,—one small, containing the chorda dorsalis; the second larger, above the first, containing the spinal cord; and the third, larger still, below the chorda dorsalis, containing the visceral structures."

Rathke conceives the ethmoid to be the anterior end of the vertebral column, and speaks of the four different groups of bones,—the

occipital with its intercalary bones, the squama; the basi-sphenoid with its intercalary bones, the parietals; the pre-sphenoid with its intercalary bones, the frontals; and the ethmoid with its outgrowths, the spongy bones and the cribriform plates. There is a gradual declination of vertebral resemblance, so that the occipital is the most like the vertebra, and the ethmoid is the least." But the vertebral form, plan, and connection of the parts is continuous and harmonious, so that the vertebral theory of the structure of the skull proper furnishes the best explanation of its organization. Elaborate study of the embryology and evolution of the skull in man and lower animals fully confirms this.

Regarding the facial skeleton, a critical analysis of its anatomical elements reveals the fact that it is closely related to the lower, the visceral arches, and is indeed modified from this division. Professor Cope, reasoning from analogy with the structure of lower animals, describes these arches as follows: First, the *quadrato-jugal*, which connects the lower maxillary with the quadrate bone of the ear in lower forms; second, the *zygomatic* or *squamosal*, which connects the upper maxillary with the squamosal part of the temporal bone; and third, the nasal arch, which is mainly a neural arch.

Concerning the origin of these arches, Professor Flower says ("Osteology of the Mammalia"), "At a very early period in the lamina forming the side wall of the cervical region of the embryo, certain thickenings appear, being thrown with their long axis transversely of the body, dipping downward. These are the *visceral arches*. Between them slit-like openings are formed, which are called the *visceral clefts*. In the lower vertebrates some of these clefts remain open permanently, forming the branchial apertures of fishes and amphibians for breathing, the gills; but in the mammalia they speedily close, and, with the exception of the first, leave no trace of their existence. Permanent structures are, however, developed in the first of the visceral arches. In each of the first two arches rods of cartilage are formed, which inclose the tympanic cavity, and from which the malleus, incus, and stapes bones, and the stapedius muscle arise. The lower or distal part of the rod forms the first visceral arch, commonly called *Meckel's cartilage*, around which the ramus of the mandible is developed. It is believed also that the distal part of the rod of cartilage in the second visceral arch is developed into the anterior hyoidean arch, or 'anterior cornu' of the hyoid bone."

Or, as Professor Huxley says ("Anatomy of Vertebrates"), after describing the origin of the gill-clefts, that the "Brachial skeleton bears a direct relation to the posterior visceral arches. When fully developed it exhibits ossified lateral arches, constituting the gills of pisces and amphibians. In the higher vertebrates the two pairs of the cornu of the hyoid bone are the remains of the brachial skeleton. Two ossifications commonly appear, near the proximal end of Meckel's cartilage. The proximal is the quadrate bone of the lower vertebrates,—the malleus of most mammals; the distal is the *os articulare* of the lower vertebrates. The remainder of Meckel's cartilage becomes modified into the mandible, which articulates directly with the squamosal bone in mammals, but in other vertebrates is united with the *os articulare*."

Professor St. Geo. Mivart says (Encyc. Brit., art. "Skeleton"),

"The third category of cranial skeletal parts is generally represented by a series of descending cartilaginous bars (or visceral arches), running forward beneath the cranium to terminate at the mouth. The inner and outer sets of arches are well developed in most vertebrates, and though there may be as many as seven brachial arches in the lower water-breathers, five is the usual number in the vertebrates. The most anterior or mandibular arch becomes segmented into an upper or meta-pterygoid portion, an inferior or Meckelian portion, and a median or pterygo-quadrato portion, which grows in front of the meta-pterygoid portion and forms the foundation of the upper jaw.

"The osseous condition of the third category of cranial vertebral parts varies extremely in different classes of vertebrates. The most anterior lateral descending bar (or visceral arch) is known as the mandibular arch. That part of it which extends forward and forms the upper jaw presents two rows of ossification,—one external, the other internal. The external, proceeding from before backward, consists of the premaxilla, maxilla, jugal (or malar), sometimes a quadrato-jugal in lower forms, a bar of bone forming an inferior lateral arch, represented in the higher mammals by the zygoma. The premaxilla, maxilla, and jugal often unite in the higher mammals (as in man) with the anterior margins of the nasal, frontal, and lachrymal to form a continuous bony external wall to the anterior part of the skull. The inner row of bones, from before backward, consists of the vomer, palatine, and pterygoid, which with their fellows of the opposite side form the roof of the mouth."

Professor Harrison Allen says in a recent letter, "The views I taught of the architecture of the skull were those of Jeffries Wyman in great part,—*i.e.*, that the brain-case was distinct from the face, inasmuch as the bones were adapted to protect the *brain*, as opposed to the bones of the face, which were in their turn adapted to protect the *visceral structures* of the face. The *splanchnic skeleton* is the name I gave to all the bones which support the viscera, as opposed to *neural skeleton*, the term retained for the bones which support the central nervous system. While the advances in embryology necessitate many changes in our conception of the skeleton, I still hold to the opinion that such a conception of the skeleton as the foregoing has immense value in clinical study, as I have pointed out. In my 'Studies of the Facial Region' (Cosmos, 1875) I attempted to show how the diseases of the bones of the face can be investigated with advantage by recalling the fact that all of them, excepting the malar bones, are in some degree covered with mucous membrane. The views I hold as to the distinction between the *membrane bones* (*perichondrial bones*, as the lower jaw, as well as those which arise from sheets of fibrous nature, as the parietal), and the *cartilage bones* (all those which arise by evolution of the osseous tissue from persisting cartilage, as the sphenoid bones) are still valid. They are to be credited to Huxley ('Lectures on Compar. Anat.')."

It might be suggested that the perichondrial, the membrane bones of the face, are really those which have arisen from the evolution of the visceral arches in higher forms,—the gill arches, which in lower forms are covered with mucous membrane, as in the water-breathers,—and that the membrane origin in the higher forms persists as a significant item of their embryological and zoological history, as so often happens.

Again, Professor Allen says (*Med. Times*, and *Proc. Phila. Med. Soc.*, etc., 1879), "Many instances of dermoid cysts have been tabulated, the result, it is thought, of imperfect nutrition at certain points along the lines of the visceral arches. Errors of development and growth-force of the face often occur, not alone in failure of the union of the arches, as in hare-lip, but processes not ending in gross defect, but exerting just enough disturbing influence over the bones of the face to prevent success in shaping the nasal and oral cavities." As a tentative hypothesis he suggests that inasmuch as the face is a result of the lateral visceral half-arches joining the median structures projected from the front of the brain-case, it follows that if there is want of harmony between the two genetic movements errors of symmetry may readily occur. Explanation may thus be given of the asymmetry of the nasal chambers, the external nose, and the two halves of either of the dental arches, entirely apart from the acquired defects in the same locality. A well-defined group of cases is noted in which the nasal chambers remain from birth partially or entirely occluded; breathing through the mouth was enforced, and the teeth came in irregularly. Such malformations frequently occur, and can be used in demonstration of the correctness of the visceral theory of the skeleton of the face.

The segmented arrangement of both the cranial and facial skeleton is in perfect harmony in both series. The neural or cranial arches are divided in the same location as the facial or visceral, so as to form a symmetrical transverse series. We observe that the first, the occipital segment of the cranial arches, is accompanied by the aural and hyoid segments of the facial skeleton, the portion formed from the lower visceral arches. Then succeeds the second, the basi-sphenoid or parietal segment, which is accompanied by the mandibular segment of the facial skeleton. This is followed by the third, the pre-sphenoid or frontal segment, which is accompanied by the upper maxillary facial segment, and fourth, the nasal or ethmoid segment, which is accompanied by the premaxillary, spongy bones, etc. In this classification each segment of either the neural or visceral series has its accompanying arch in the other series, making the arrangement symmetrical and mutually supporting. It might be assumed as conclusive that this theory of the jaws and their relationship would settle the vexed question of the homology of the jaws,—*i.e.*, that they are merely visceral arches, and are homologous with the visceral series.

Mechanically, the facial skeleton is built for the embodiment of force in the act of mastication. A longitudinal section of the spinal column reveals the fact that the form of the structure is that of a curve in the region of the cephalic vertebræ, the ethmoid constituting the termination of this column. The end of this curve supports—has suspended under it—the structure for receiving the impact of mastication,—*i.e.*, the upper maxilla with its armament, the teeth. The upper jaw is built for the embodiment of static force, and is supported and backed by the spinal column, which is curved over to receive it. It is erected to endure the shock of impaction from all sorts of biting,—*i.e.*, cutting, tearing, crushing, triturating with longitudinal and transverse motions, and to resist and stand firm during all the varieties of movements incident to mastication. The upper jaw is the embodi-

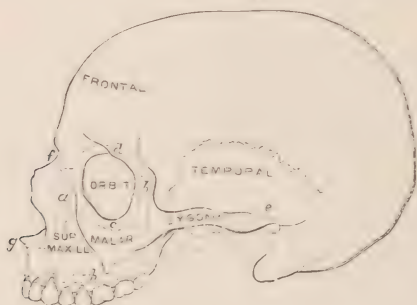
ment of static force,—the receiving structure, the anvil. The lower jaw is swung to strike against it, and is the embodiment of active force,—the impacting agent, the pestle, the hammer.

In an analysis of the *upper jaw*, we find that it presents certain elements of architectural strength and beauty that invite our attention, as it is so admirably adapted to the purposes for which it is constructed.

Professor Harrison Allen describes the upper jaw as being fundamentally composed of "three piers or columns for the reception and support of the impact of mastication, these piers being supported by arches and bounded by curves." (See Fig. 1.)

The first (*a*) is the central, the *nasal column*. It begins with the suture at the connection of the nasal bones and maxillaries with the frontals, the brain-case, which is a strong point. Below, the nasal bones unite with the processes of the superior maxilla and the azygos processes of the vomer, the latter bone assisting in the distribution of static force. The column then leads down through the body of the maxilla and the canine eminence to the anterior alveolar base. It

FIG. 1.



ARCHITECTURAL SCHEME OF THE UPPER JAW.

a, nasal column; *b*, malar column; *c*, pterygoid column; *d*, supra-orbital arch; *e*, infra-orbital arch; *f*, upper nasal half-arch; *g*, lower nasal half-arch; *h*, maxillary arch.

marks a strong pillar of resistance leading from the anterior corners of the dental arch to the forehead. The two nasal columns appear arched and divided about the nasal openings, and have their heads encasing the roots and receiving the cuspids, which are the strongest teeth in the arch. These teeth are planted in the heads of the central static columns, which mark the lines of greatest resistance. The most serious mutilation that the face can suffer in regard to its dental elements is the loss of the cuspids, for this column then shrinks and atrophies, and the lost fullness of the face can never be restored by artificial means. This column is, therefore, a most important factor in the mechanics of the face and the philosophy of expression, and illustrates the beauty and perfection of the design, and should not be injured by the extraction of the cuspids.

The second is the *malar column* (*b*), and extends from the fronto-malar articulation down to the tuberosity of the superior alveolar ridge. We trace it from its beginning at the union of the frontal with the malar bone, which is a strong origin, down through the body of the malar and the superior maxilla on to the alveolus of the third molar. This is the column largely supporting mastication, and its

structure adapts it well to the purposes of its office, as it is well braced and supported by arches and curves. It is assisted in its duty of bracing the superior maxilla by another column, the pterygoid.

The third column in the scheme of architectural construction is the *pterygoid* (*c*). It is traced backward from the posterior lateral base of the superior maxilla, through the pterygoid plates to the basiphosphoid. This column has a strong origin and base, and assists materially in bracing the alveolar ridge against lateral movement in mastication.

There are, then, three pairs of columns or piers that enter into the mechanism of the upper maxilla, and which contribute to the general architecture of the middle face,—*i.e.*, first the nasal, second the malar, and third the pterygoid.

The framework is further elaborated by a second series of elements entering into the structure of the parts,—*i.e.*, the arches and curves by which the columns are bounded and supported. These arches also carry the parts which perform the work to which the superior maxilla is dedicated.

We notice first the *supra-orbital arches* (*d*), which curve over the orbit and spring from and rest upon the superior terminations of the nasal and malar columns, giving them a strong base and conveying the force received through them to the frontal bones, thus distributing the impact of the lower jaw over the solid brain-case.

The second is the *infra-orbital arch* (*e*), resting against the bases of the columns and ends of the supra-orbital arches, which sustains the body of the upper jaw.

The third is the *upper nasal half-arch* (*f*), with its base resting against the point of union of the orbital arches and bracing the nasal columns.

At the termini of the columns we notice—

First, the *lower nasal half-arch* (*g*), its free end resting on and supported by the nasal column, and sustaining the anterior alveolus with the incisor teeth. This pair are important elements of the facial structure, as they receive the impact of the incisive region, and resist both the pushing and vibrating motions of the incisive actions.

Second, the *large molar arch* (*h*), extending from the nasal to the malar columns and resting on them. These are long curves, and the spring of the arch is considerable, but it is admirably constructed for the purpose of receiving and distributing the shock of mastication, whether vertical or lateral, as it is well supported and backed in all directions.

Third, the *malar buttress*, which flies out to meet the zygoma. It seems especially constructed to sustain the maxilla against lateral strain.

Fourth, the *pterygoid arches*, which support the pterygoid columns.

We have, then, in this framework of the upper face a system of columns and arches that compose a structure most admirably adapted to its purpose of embodying static force. It is built to receive the shock of impaction of cutting and crushing, as well as to resist and stand firm during all sorts of horizontal motions in the trituration of food.

The *lower jaw*, however, is the embodiment of active force in the various acts and motions required for the reduction of food. It is so shaped and suspended by strong muscles, swinging from the upper face and cranium, that it can be brought directly upward with force

and effectiveness in the performance of these acts. Indeed, the muscles which close up the jaw are so strong, and those which open it are so weak, that the closing motion is the only strong movement and gravity is the only opposing force. Being suspended, the triturating muscles can move it more freely within the masticating area than if it were in the opposite position,—*i.e.*, over and lying on the motionless jaw. Its suspended position is admirably adapted to the greater effectiveness of the purposes of its function.

The movable mandible is itself composed of columns and apices, which can be briefly analyzed. (See Fig. 2.) We notice—

First, the *mental column* (*a*), descending from the cuspid to the base of the jaw, and receiving the force of impaction on its apex.

Second, the *coronoid column* (*b*), extending from the coronoid process downward to the base of the jaw, and to which the great muscles of impact or closing are attached.

Third, the *condyloid column* (*c*), which extends from the condyle downward to the ramus, and whose base is the hinge on which the jaw-lever is swung.

The lower jaw is a lever of the third class, with the condyle for its fulcrum and the mental column for its apex, with the coronoid column lying across it to give attachment to the muscles of elevation.

FIG. 2.



ARCHITECTURAL SCHEME OF THE LOWER JAW.

a, mental column; *b*, coronoid column; *c*, condyloid column; *d*, body-arch, or curve; *e*, arch of the symphysis; *f*, molar arch.

We notice also the series of curves and arches which enter into its structure, as follows:

First, the long *body-arch* (*d*), as a curve of the body of the jaw, extending from the base of the condyloid to the mental column, with the coronoid column lying across it.

Second, the arch of the symphysis (*e*), which connects the two halves of the jaw in front; it springs from one mental column to the other and carries the incisive region.

Third, the molar arch (*f*), springing from the mental to the coronoid columns, for the support of the molars during mastication.

And fourth, there might be added the glosso-pterygoid curve on the inner surface of the ramus and jaw, for the attachment of the triturating muscles.

The lower jaw is thus well constructed for the embodiment and effective employment of active force in the various acts of mastication, as the upper jaw is for the embodiment of static force and resistance of the masticating movements.

The teeth fulfill the office of being the mere armament of these

structures for the effective operation of the two opposing forces when applied to foreign substances. Their arrangement in the jaw, the form and structure of the jaw, as well as tooth-forms, have been dictated by and controlled by the demands of food selection. The forms of the two, both the teeth and their supporting environments, have been evolved together.

In man, as is well known, the jaws are much reduced, in harmony with the reduction of the function of mastication, as compared with the greater demands of this function in lower animals. But they still serve an excellent and effective purpose. They are constructed on mechanical and artistic principles that well repay study, to the end of a better understanding of the designs of their organization, and their application to, and illustration of, the function they were intended to subserve.

THE CAUSES OF DENTAL CARIES.

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ALL authorities agree, in effect, that caries, the molecular death of the teeth, is at present the most frequent disease which afflicts the human family,—at least as far as the civilized nations are concerned; but their opinions as to the cause of this condition are somewhat divided,—less so, however, than a few years ago, before the undeniable facts of recent microscopical research were brought out.

It may, at all events, not be out of the way to review the nucleus of these opinions, in order to combine them into a systematic whole for comparison and study. In doing this we will not refer to the time or persons of those meritorious investigators who propagated them, avoiding, in this way, any glorification or detraction or complication, for what we have finally in view is only to show that all these opinions compel to the adoption of a method, destined to redeem the human family from dental caries. In what this cure consists will become clear hereafter. It is, in fact, not desirable to make this inquiry lengthy or exhaustive, for, of all the branches of dental surgery, the etiology of caries is that upon which most has been written, and which, therefore, is, in some of its aspects at least, sufficiently familiar to everybody. The popular confidence in medical science is not based upon the amount of peculiar knowledge stored up in the academies, but upon the practical ability of the medical men to cure. It is only the cure which is desired, and all studies which may be required are shaped to this end.

This makes clear why the etiology of caries has received such a great deal of attention, for, as long as the cause of a disease is not known, it cannot be removed, and all therapeutics has the one aim, viz. to remove the cause. With the understanding of the real cause of a disease we are its master, and by the re-establishment of health, we can claim to have removed the cause.

The entire system of every organic structure (hence, also, of man) is dependent for its health upon two main sources,—nutrition (acquisition of new material) and circulation (distribution of this, and removal of the waste material). These are two such complicated processes, that, in the effort to understand and control every part of

them, therapeutists have lost sight of them as entirety. And while considerable labor has been employed in tracing the most occult minutiae of all particulars in the function of every single organ and tissue, it has been overlooked that to secure a return to normal nutrition and normal circulation of the entire system is the only way to remove the cause of every disease in every single organ and in every smallest part of it. It has been overlooked that the health of every organ and every molecule is too intimately connected with the health of the entire system to permit of the slighting of general nutrition and circulation under the pretense that the disturbance is "only a local one," and can be treated independently; but such blind specialization has, as a rule, a baneful effect.

Owing to this fallacious policy, modern therapeutists do not record that amount of cures which is to be expected from the high range of general progress in all other branches of human culture, and they have hence lost a good deal of popular confidence. The reason for their failures is in their narrow-sighted effort to remove the presumed local cause without sufficiently recognizing the necessity of a general treatment. This, of course, requires such a wide study as would enable them to grasp their subject in the whole of its natural, and not of its doctrinary, relation. Hence the singular spectacle of one therapeutist being ignorant of hygiene, another knowing nothing of water-treatment (hydropathy), another nothing of the natural dietetic character of man, another neglecting the results of cultural history and the philosophy of statistics, although all these topics are the most essential of all for a successful physician, inasmuch as they comprise the principal circumstances by which health can be affected or the lessons in which the fundamental causes of disease are displayed. These important pursuits being, however, cultivated by the greatest philosophers of the earth, it is our duty to concentrate them upon therapeutics, which deals with the most valuable capital in the world (the life of man), and to consider them in the study of dental caries, of which they are, properly speaking, the necessary components. We are, however, not to describe in detail in this paper the use that might be made of these materials, as its object is merely to show that it is indispensable that we should deal comprehensively with the highest branches of knowledge, and not make only local examinations and local treatments when we want to arrive at ultimate results through fundamental truths,—for example, when we wish to find the fundamental cause of caries.

The problem immediately before us is to ascertain the method of discovering the law by whose application we may be enabled to prevent or arrest caries; in a word, that cause which, when excluded or removed, warrants or restores health. For this end it will be convenient to state all conditions which have been found to produce or invite caries, and to show that the views of all preceding pathologists will strengthen and not combat the theory that omnivorous habits are the great final source of dental caries, however strange this will appear to those who believe that omnivorism and perfect human health are compatible.

A few introductory lines will suffice to show to what conditions the teeth are subjected in the mouth and how they are fitted for them. It goes, of course, without saying, that the teeth are to be regarded

as strictly vital organs as long as they possess a healthy pericementum, and that every molecule of the tooth which is free from caries is alive and subjected to the laws of vitality.

The human teeth receive their protection against any injurious influences, like thermal shock, acids, dust, and pressure from smaller foreign bodies, by three factors,—the tongue, the soft structures, especially the gums, and the oral fluids,—and it will be accepted as a truth, that as long as these three protective elements are in a perfectly healthy condition the teeth are safe against caries. We here except the cases where the roots lose their protection,—the alveoli,—as these are rather exceptional, and caries concerns mostly only the crowns and not the roots. The tongue will exhibit a nervous excitement and restlessness as long as any disturbing foreign substances in the mouth are discoverable; likewise will the gum manifest pain should it be irritated anywhere, and the oral fluids, especially the saliva, will increase their flow in the same ratio as their help is required. The strength and rapidity with which this assistance is rendered is often astonishing, and Dr. Ottolengui remarks very properly, "As soon as a patient is hurt, fluids are discharged into the mouth." The lower teeth are more profusely bathed in the oral secretions and in more frequent contact with the tongue, and this may partly explain why they are less exposed to caries than the upper.

This physical protection is very necessary, for the permanent teeth are destined for lifetime's use, and when we see so few metropolitans nowadays who enjoy the possession of a sound and complete denture, we may infer that they have not obeyed the laws of their physical being, and that this is the reason why they have forfeited those valuable treasures which, in the language of Don Quixote, are "more precious than diamonds."

Besides this, there is also a psychical protection erected, and though it not only shelters the teeth, but the whole economy, yet the teeth would be the first parts which might be damaged in its absence. This psychical protection is rendered by the senses of smell and taste, which enable us in most cases to discriminate between healthy or esculent and impure or poisonous substances. Our main protector will, however, always have to be our brain, and by intelligently studying the causes of caries we are best enabled to escape this disease or to offer relief.

The structures of the crowns of human teeth, called enamel and dentine, possess no recuperative power. Any part in them whose vitality is destroyed will be lost forever; it cannot repair itself. There are observations on record that in young children with soft teeth carious cavities have disappeared as the decayed part was really reproduced. This evidence of vigorous vitality seems, however, rather to represent cases where the growth of the teeth was not yet completed, and as long as the dentinoblasts have not yet retired from office they might naturally even take care of a leak.

The vitality of every structure requires that its natural molecular relations remain undisturbed, and the destruction of the inorganic matter must hence necessitate that of the organic matter with which it was and ought to remain in relation. Caries of the teeth is thought to be such a process which, strictly speaking, attacks the inorganic matter only, so that the organic matter is involved second-

darily. If it were not for the inorganic matter, the organic matter would hardly be in any danger in the human mouth. This is clearly manifested by the fact that the soft tissues of the mouth, which consist merely of organic matter, suffer comparatively little from any disease. The substance of the teeth, however, every molecule of which consists of organic *and* inorganic elements, is the object of the greatest havoc in the same mouth which otherwise is free from disease. For this reason it is commonly and, we may say, justly believed that it is the inorganic matter which has to yield first in caries.

If the organic matter is afterward destroyed by one or more known or unknown forces, it may be regarded as a matter of little importance, for, when once separated from the earthy half, the organic matter has to fall anyhow, and even should it be left alive it would be of no use to the system, as it is only the earthy matter which gives strength and hardness to the teeth and makes them fit for the work of mastication. Only in so far as the dissolution of the organic matter can result in the formation of acids which in their turn may become dangerous to the neighboring tooth-substance which is free from disease—only thus far is it of practical interest, as this secondary stage of caries may alternately become the cause of a further progress of caries. This can, however, hardly be called a new cause of caries, because it is no distinct factor in itself. If we only know what breaks down the earthy matter, then the cause of caries will be clear to us. It is now also generally conceded that the roots are far less liable to decay than the crowns, and that dental caries commences externally and proceeds toward the interior of the tooth. This is one, and perhaps the only, instance where we have to take exception to Hunter's law, that all diseases move more rapidly toward external than toward internal parts.

Since we see that the enamel is the first tissue attacked by caries, our main question will be, How does caries succeed in breaking through the hardest substance in the whole human body,—the highly crystallized enamel, which contains about ninety-seven per cent. of mineral matter? For it will be understood that as soon as the protecting cover of enamel is lost at any point, the further destruction of the crown through caries is an easy process. The same forces that are able to destroy enamel will so much the more be able to destroy dentine. The thirty per cent. of organic matter contained in the latter can form no barrier for the progress of caries, for not only must this unconditionally lose its vitality and, when dead, become decomposed as soon as the inorganic matter is dissolved out of it, but it has also been demonstrated by microscopists that fungi and microbes are constantly present in every mouth, and these organisms are able to decompose any *dead* organic matter, thus producing an acid fermentation. This acid fermentation is, however, very small in the incipient stage of caries, and has in a healthy mouth no practical existence, not only because the dead organic matter does hardly amount to the most minute quantity, but also because there is a continual flow of fluids in the oral cavity which dilute and really more than neutralize this eventual acidity resulting from fermentation of parts of the dentine. So much is sure: With the removal of the enamel (always including Nasmyth's membrane with this name) caries is encouraged considerably, and it is only too plain that it works its

way much more rapidly through the dentine, which consists only of seventy per cent. of inorganic matter, and is hence endowed with less immunity than through the enamel.

Immediately under the enamel we find the so-called interzonal layer, an extremely sensitive border-line between enamel and dentine. An exposure of this sensitive layer must, sooner or later, result in a local inflammation, for everywhere where there is undue friction, parasites, sudden change of temperature, chemical influence of acids, etc., inflammation will occur. How much the more will it then happen (in the mouth, where these conditions take place so often) to the interzonal layer! As inflammation is a disturbance of nutrition, it is natural that the medullary elements of the interzonal layer must decay when submitted to inflammation causing interference with their nourishment for any length of time. Congenital exposure of the interzonal layer may hence be regarded as a predisposing cause of caries, and this would be an instance where (exceptionally) caries begins with the destruction of the organic matter. These are the conditions presented by the tissues of the teeth themselves, and we can now proceed to enumerate those changes and forces which are presumed to be the causes of dental caries.

The causes of caries can be distinguished as external and as internal influences, and it may be well to state that the latter are always entirely powerless or illusory without contravention of hygienic laws, whereas the external influences can only, in such cases which represent traumatic disturbances, be said that they cannot safely always be "neutralized" by a proper regimen. Therefore, if everybody would live on a hygienically correct plan, caries could invade the human system only under the foreign flag of external influences, and even then only seldom. As internal influences, may be classified: deficient development, malnutrition, loss of lime-salts, morbidity, suppression of tegumentary respiration, and senility. And it will be observed that these causes, with the exception of malnutrition only, are all predisposing or mediate or indirect causes only, to which the real exciting cause has to be added from the outside. As external influences, may be regarded: micro-organisms, acids, and physical agencies. Of these, the first two groups are exciting, immediate, or direct causes, or, in the opinion of many experts, the only real causes of caries, whereas the physical accidents create only a predisposing condition for caries. The individual teeth are, of course, variously afflicted by caries, according to the accidents and contingencies to which they are subjected through use. We shall enumerate now the various causes belonging to each of the groups named.

Physical Agencies.

To begin with the latter, we find that mechanical destruction of the enamel may expose or split the dentine, thus creating loopholes for the decomposition of small or larger particles of food, which during fermentation form acids; these acids dissolve the inorganic part of the tooth-structures. This mechanical reduction of the enamel may be brought about—

By the friction of badly fitting artificial sets and clasps.

By the excessive use of hard tooth-brushes or coarse tooth-powders.

By the use of metallic tooth-picks or dental instruments.

By biting on hard substances, such as hard candies, fruit-stones, nuts, etc. Dress-makers and other women bite off threads, whereby they injure their incisors. In the same way does the playing of the clarinet or the holding of a tobacco-pipe injure the teeth.

By habitual mastication of abnormal food-substances.

Or the entire tooth, or a part of it, may be fractured or injured by traumatic cause,—*i.e.*, a fall or blow on the face, an incomplete extraction or a forcible displacement, etc.

Or the enamel may be fractured by sudden and marked changes of temperature in the mouth; for example, by hot dishes immediately followed by ice-cold water, which may produce crevices down to the dentine, where organic matter may undergo decomposition without hardly a possibility of being prevented. Violent thermal changes will, however, set up an inflammation of the pulp instead of forming fissures in the enamel.

Acids.

Food-particles may decompose and excrete various acids which attack those places where they lodge. This accumulation of food-particles is favored—

By fissures (congenital faults) in the enamel, especially on the morsal surfaces.

By irregularity, malformation, malposition, and malocclusion of the teeth.

By insufficient reach to the sucking or scouring action of the tongue.

By morbid recession of the gum from the contact-point (which may occur through irritation produced by tartar, or by a vitiated state of the oral fluids, or by the death of the pulp, or by the loosening of a tooth, or by tobacco-chewing, or through the action of micro-organisms).

By insufficient cleanliness in the mouth (which in the opinion of many dentists even requires for its accomplishment antiseptic mouth-washes, though they forget to prescribe the brushing of the tongue, which is more effectual than its bathing).

By any roughness produced on the crown (through instruments, calculus, imperfect fillings) which forms a recess or nidus for *débris*.

By artificial attachments to the teeth so that food may be wedged between the foreign body and the tooth.

By the oily cover left on the necks of the teeth through the fatty acids of the combustion-products of tobacco in smoking.

Acids may also be introduced into the mouth from without, and when in sufficient strength they may in the course of time chemically dissolve or soften by degrees the earthy part of the teeth. Examples: sour or acid dishes or drinks, medicines, mineral waters, acid mouth-washes or tooth-powders, chewing-tobacco, etc. Among the noxious drugs used in the preservation of food, boracic and salicylic acids (which destroy the enamel so rapidly) play the largest part. Mince meat and beer contain, in most cases, salicylic acid, and it may be imagined to what dimensions the havoc wrought through these acids must amount when it is considered that in 1892 the breweries produced two hundred million hectoliters of beer.

Furthermore, acids may be excreted on localized portions of the

mucous membrane when it is irritated continually by contact with roughnesses on the tooth, however small these may be ; for example, tartar near the neck, or overhanging or badly finished fillings, etc. ; or the mucous membrane may experience a pathological change through the congesting influence of tobacco-smoke, which causes the mucous glands to give off acid secretions.

Eructation or vomiting may throw hydrochloric acid from the stomach into the mouth. It seems, however, hard to imagine that such a weak acid as is associated with diluted pepsin should do any harm to the teeth, especially when we consider the shortness or rareness of the occasion.

Galvanic action from two metals of different potentials, placed in the mouth, may develop hydrochloric (HCl) or nitric (HNO_3) acid. In how far the small amount of metal represented by a filling is practically able to create an electric current, and if such travel from a higher to a lower potential can also take place in the presence of alkaline oral fluids, has practically not yet been ascertained. The analogous case, on the other hand, of current arising from prosthetic work made from two metals of different potentials would be very rare.

Inhalation of great quantities of dust may affect the teeth when they become covered with it, as the dust may enter into a chemical combination with the enamel under the influence of the oral fluids which may result in its decomposition. This may occur in any industrial establishment where powdered chemical ingredients are handled, or in any confectionery or flour-mill where finely divided sugar or flour fills the air, or in printing-houses where the dust of lead flies around, or in the working-shops of mother-of-pearl turners where the dust is laden with particles, creating an atmosphere worse by far than that in many mines. Also the rag-men have to suffer from the dangerous dust in which they constantly deal.

Inhalation of poisonous vapors may chemically injure the teeth ; this may occur in chemical and in match factories, also during the smoking of opium, or in sulfur baths, etc.

This comprises what has to be said about acids, which form one of the main exciting causes of dental caries ; and although the teeth as parts of the vital economy are not so helpless against their attacks as they would be when extracted and exposed to the same acids, yet they cannot preserve their immunity when the struggle lasts too long or becomes too violent, on the same principle that "many drops hollow a stone."

Micro-organisms.

We come now to consider the other, or what is even thought by highest authorities the only exciting cause of caries ; and as it is the one which has appeared last in the field of research, it is at present highly in style, and sheds its brilliant rays over the entire scientific world of dentistry. It has become almost dangerous to think without the support of a microscope, dangerous to assert without a display of molecules and cells, but the world would soon require a new arrangement if we had to part from what we cannot prove by chemical and optical demonstrations. Without deviating too far from our object, we may remark, that however valuable the results of optical magnification may be, they are decidedly inferior to the results of

correct reasoning based upon the observation of the whole body and of all factors of physical life, and the confidence in some subordinate microscopical resources cannot inspire us to discard the immense treasures of wisdom and philosophy stored up through five millenniums, which teach us that the severity of proof requires that useful inquiries must be extended over the entire surface of human life, and not only over the fragment of a decayed tooth. As long as experience and solid reason are the two great pillars of truth, we do not need the microscope as the tutelary angel of hygiene or of human physiology, for by far greater benefit can be derived from the lessons of those nations who remained free from caries without the optician's tool. The real principles of etiology have to be founded upon general hygiene, and not upon microscopy, as the latter can hardly serve as superstructure, and much the less, then, as a base. Hence the microscopists have no right to usurp the position of leaders of hygiene; they are not able to teach us how to reform our life in order to escape caries. Indeed, Hippocrates's view (which was proclaimed to the world 2350 years ago) that vitiated secretions have to count for the cause of caries contains one thousand times more wisdom than the revelations of microscopists, because it suggests the great truth that the condition of the blood (from which the secretions are derived) is responsible for the mortification of the teeth. Shall we ignore for these reasons what has been discovered about micro-organisms? No, certainly not; but much less must we stop there. Every little particle of truth is precious, and so is the knowledge of bacteria; but fundamental truths are more precious than secondary truths, and the truth highest in rank deserves the most attention.

We are now ready to examine the facts discovered by the microscope. They are the following:

Every human mouth contains millions of bacteria carried thither by food and through the air, and they find the most favorable conditions for their existence in the mouth,—viz, moisture and warmth,—and they live on dead organic matter, not on living organic matter, as otherwise they would soon eat hollows through the cheeks, but on dead or dying organic matter always present in the mouth in the form of epithelial cells, food-particles, etc. They have, therefore, a very useful function, as, by removing dead matter, they act as road-sweepers, like the *Opalines* in the frog, or the *Histriobdella* on the lobster, or the species *Nemer-tina* on the crab, or the small crab on the large *Modiola*, or the insects on the birds, etc., which all live, not at the expense of their host, but for his profit and good health. But of the mouth-bacteria it is asserted that they unluckily balance the good they do by their excretions. They have been found to excrete an acid which dissolves the inorganic matter of the teeth. This acid is contained in the ptomaines or alkaloids derived from the bacteria, and hence the ptomaines are really the immediate factor in destroying the tissues of the teeth. This action has sometimes been described in words saying that “fungi bur through the enamel”; but such language is rather confusing, because by burring we understand the activity of instruments and not of acids; dentists bur through enamel, but fungi do not.

When we take hold of this description, we find two loopholes. The first one is, How can it be stated that every mouth contains

mouth-bacteria as long as only very few mouths have been examined? The earth is populated by fifteen hundred millions of men, of which nine hundred millions are uncivilized, the majority of whom live on a frugivorian though not on a hygienic plan; they never smoke, and never take other drinks than water or milk, and live in very different atmospheres, of which that in the civilized communities (where the bacteria were found) is certainly not the best; they enjoy a different average of longevity, and last, but not least, they are, in many instances, entirely free from caries. All reverence, therefore, to the students of Berlin or others who have been the estimable objects of investigation; but are these the types of mankind? are their mouths the standard for past, present, and future? Individual subjects, however satisfactory they may appear to the superficial observer, if they do not live on a strictly hygienic plan, if they do not confine themselves to frugivorian diet, and if they are not the offspring of recognized healthy parents, are unfit for a scientific standard of normality. Hence nobody is entitled to say that bacteria may be found in every human mouth, for there are very different mouths in the tents of Arabia, in the villages on the Himalaya, from those to be found on the streets of a civilized capital. The earth has two hundred and seventy metropoli (*i.e.*, cities of more than one hundred thousand inhabitants each), and these metropoli represent together a population of one hundred millions. As only the smaller part of these have been the object of medical investigation, the records must appear desultory.

The other loophole is the circumstance that people who live in the same atmosphere exhibit very different degrees of dental caries, and some are even entirely free from it. How can this occur with a mouth bathed with the same amount of bacteria, or do equal causes not produce equal effects? Do bacteria which cause caries in one mouth not produce this same condition in another? Why shall the same quantity of bacteria be powerful enough to entirely destroy millions of dentures, and yet some few dentures in the same city withstand their efforts and remain entirely free from caries? If it be true that bacteria are the fundamental cause of caries, then every mouth containing bacteria should become the prey of caries; as the sun is the fundamental source of all treasures of the earth, then, also, the treasures of Chicago must have their fundamental source in the sun. Chicago alone cannot escape from what all other places of the earth experience. Neither could the teeth of Michael Eugène Chevreul, the distinguished French chemist, who died four years ago at the advanced age of one hundred and three years, have escaped from the havoc of caries before his fortieth year because his mouth also contained bacteria which implicitly produce caries within the first forty years; and yet Chevreul had no caries, and so had millions of other men no acquaintance with dental caries. Moreover, the case recently reported by Dr. C. N. Peirce, where true caries had destroyed an unerupted wisdom-tooth, proves that bacteria are not even an essential factor for caries, as, in this instance, caries did occur on a tooth which never was exposed to external influences, hence also not to bacteria.

These injunctions are two bitter pills for the microscopist, for they affect so extensively the theory that micro-organisms are the *funda-*

mental, the ultimate cause of caries, that everybody is forced to the conclusion that there must be some real cause behind these bacteria which brings them or any other medium into dangerous activity. This does not deny the fact that the bacteria play some part, or even the immediate part, in the production of caries, for this is a well-established fact which permits of no doubt or disparagement, but, it seems, the soil has first to be prepared for them through processes within the tooth.

There are circumstances where these organisms grow beyond normal in number and activity; for example, when the atmosphere is saturated with micrococci derived from putrid decomposition of organic bodies, as in bogs and in malarial districts, constantly passing into the mouth the air will deposit abundant quantities of micrococci which must exert a deleterious effect at last, for, when in such masses, even strong vitality will not be able to stand their attack for a great length of time. An over-crowded sleeping-room is likewise a hearth of contagion.

Also drinking-water when mixed with impure organic particles may have an effect on the teeth, as it carries putrid material into the mouth. In such a case it would not be the water itself which does harm, but only the abundance of pathogenic microbes for which the water forms the vehicle; but it would be a difficult problem to say if the naked presence of the microbes causes the disturbances, or if the effects come through the system after the microbes are absorbed through the villi into the blood.

We may turn now to the internal or systemic influences, where we find the following groups:

Deficient Development.

Defective calcification of the teeth may leave spaces on the crowns which are unprotected by enamel, and which though originally offering no nidus for the accumulation of food *débris*, yet expose the softer and sensitive dentine, which may become inflamed or worn out through attrition, and when deepened become a region of decomposition.

This incomplete covering with enamel or partial absence of enamel may be due to eruptive fevers, which leave grooves and pits due to and indicating arrest of development; general cachexias during the stage of dental formation interfere also with the nutrition of the teeth.

The entire substance of the teeth may be poorly (*i.e.*, insufficiently) calcified, owing to a long-continued constitutional disturbance which did not permit of proper nutrition of the dental organs.

Malnutrition.

A general malnutrition of the entire system, owing to a faulty diet, must naturally involve the teeth, which when badly nourished soften in structure, and in this way offer less resistance to any destructive agent. Not only this, but the enamel will be eaten away also, because the oral secretions which have likewise a faulty composition will show an acid instead of an alkaline reaction, and begin a perverted activity; instead of protecting the crowns, they will attack them and produce what is known as erosion. A morbid modification of the saliva and mucus can only take place under malnutrition.

There are many observers who think that caries is much encouraged

by the circumstance that the interchange of the oral fluids is stopped during sleep, and that hence the night is actually the birthday of caries, as it has been demonstrated that in many mouths the reaction of the saliva, when tested early in the morning, is acid. While all this is true, we are yet not entitled to reprimand nature that no swallowing can take place, and that the epiglottis has the prerogative of being held open during sleeping, as it is not the quarantine to which the oral fluids are subjected during night which predisposes or excites caries, but simply the improper nutrition which results in a (sometimes only slightly) degenerated composition of the saliva, so that it cannot stand the test of stoppage during sleep.

An electrolytic reaction of the saliva is said to dissolve the crowns of the teeth, which are the positive elements, whereas the roots are the negative ones. As this reaction positively does not take place under healthy conditions, it would require a special explanation as to what are the causes of this reaction; at all events, it would require a perverted condition of the oral fluids. Any change of climate, when not compensated by a change of dietetic and other habits, may materially affect the teeth, though it is not the climate, but the wrong habits, which have to account for that. Or caries may be caused by a diet which insufficiently supplies the blood with lime-salts, though it may offer all other constituents in abundance. The teeth, however, being chiefly dependent for their existence upon lime-salts, have to starve during their development, and will appear as weaklings. This is mostly the caries of rich people, for in these the teeth have practically to starve. Lime-salts can only be found in the fruits from field and tree, and also in the drinking-water. Notwithstanding this, we find hardly one dentist who advocates a frugivorian diet, or who would even warn his patients not to deprive the flour of the highly valuable bran; the consequence is that many nations consume a bread which is a ridiculous farce in comparison with what it could and ought to be, were not such stupendous practice predominant in the city bakeries. Or the individual, and not only his teeth, may be exposed to a long-continued starvation, which precludes sufficient nourishment; this may occur under the influence of disease, or of accidental causes, or of poverty, and this will invite caries,—the caries of the poor. Lack of nutritive circulation in the tissues of the teeth may result in their insufficient nutrition, which would cause a softening of their structure and weaken their resistive power against caries. This may occur as a consequence of lack of jaw-exercise when the teeth are unduly exempted from their legitimate work of grinding by the use of soft or even fluid meals, or by absence of antagonists. Or it may be the outcome of general anemia, or it may happen when the pulp or the pericementum is suffering and unable to fulfill its office of nourishing the tooth. In this respect it is significant that caries will be often found associated with tortuosity of the roots, which favors stagnations in the pulp, whose sickening becomes the precursor of caries.

Loss of Lime-Salts.

Or the individual may be well nourished in all respects, but any disproportion between the demand and supply of lime-salts may reduce the density of the tooth-structures,—for instance, during pregnancy or diabetes mellitus, etc. In these cases the demand for

lime-salts is increased beyond normal, and the system establishes a retrogressive metamorphosis. This can also happen under mental overwork, debauchery, sleeplessness, and intemperance,—conditions where the expenses are always greater than the income. Many mothers lose a tooth with every child.

Morbidity.

There may occur a deposit of pathogenic material through the nutritive current within the teeth, thus making the teeth the seat of morbidity. This dyscrasia may result from constitutional impurities like syphilis, scrofula, smallpox, measles, etc. It is a common habit among physicians to examine the teeth of certain patients for evidences of syphilis. Or poisons like mercury introduced into the system may prefer the teeth as the place of settlement; their character as foreign substances makes them, however, unbearable; a struggle for existence ensues, which, in such poorly organized tissues as the dentine and enamel, must end in their decay and death. This would be an exception to the rule that caries begins from the outside, for here it begins from within. While the cosmetic lotions of our generations frequently contain mercury, the paint of the Egyptian ladies, four thousand years ago, contained lead. In both instances the teeth have to suffer under such poisoning.

Suppression of Respiration.

The teeth as a part of the tegumentary system are partly dependent for their health upon respiration; if this is cut off through foreign obstructions, like calculus, gold caps, etc., the tooth will soften in structure and undergo gradual decay. Through the suppression of exhalation the products of physiological regress are retained within the hard structures, and they begin to mortify as soon as the canaliculi are obstructed.

Senility.

Every part of the human system is destined to die, so also the teeth. In consequence of old age, vitality may recede from the periphery of the crown more and more to the interior, as the pulp has nearly ceased its activity. Then the enamel may crumble away in brittle particles; but whether this leads to caries is doubtful, as in fact caries rarely appears after the age of forty, and nearly never in old age.

To get at the bottom of all these causes, we may ask, How can we remove them in order to escape from caries? And we shall see that one single rule will be sufficient to break the force of all those deleterious elements which induce caries (except only the mechanical injuries), and that one rule for the whole term of life will suffice to set dental caries at defiance. And this rule, which was discovered thousands of years ago, says, "Live according to the rules of nature,"—*i.e.*, on a strictly hygienic plan, and observe a frugivorian diet.

All non-poisonous fruits from field and tree possess a nutritive value which affords the development of the *highest* physical and psychical perfection. The truth of this assertion has been demonstrated in innumerable instances by the fact that no diet enables man to reach such

a high degree of longevity (and hence of vitality) as a frugivorian does. Vitality is the most effective germicide, because it is present in every atom of the system. A frugivorian diet brings the fluids and solids into a state of better resistibility than any antiseptics ever can. Antiseptics, though more powerful, are not so effective as the efforts of a perfectly healthy system, because they can only act on the outside where they are placed; they can never permeate the entire substance of a living tooth, and if they could it would be to the utmost undesirable, as they are poisons. The best teeth, teeth constantly free from caries, are not to be found in the mouth regularly bathed with antiseptics, but in the best and healthiest system, which again premises a wholesome diet and hygienic regimen. The best mouth-wash cannot change a scorbutic saliva into a healthy one if the regimen which permitted the outbreak of scurvy is not changed also. Caries is a systemic disease, and requires systemic prophylaxis. It is not by antiseptic mouth-washes that we reach the healthiest conditions in the mouth, but by a pure hygienic life, which excludes everything pernicious to general as well as to local health.

Some investigators have spent, or rather wasted, great trouble on the demonstration of the fact that fruits and vegetables contain more acids than meats, as if every child could not find that out within a second by mere tasting. To their discovery they added promptly the following conclusions: "Acids produce caries; fruits contain large amounts of acids; consequently fruits are the generators of caries." Nothing could be more misleading than this short-sighted argumentation, by which its originators have really dug their own graves, in the eyes of every man who has his sound senses. Physiological investigations must not be based on dusty books or chemical experiments, but on the golden experience of life, for physiology is the study of organic structures in a living and healthy state. Chemical analysis, however, can never ultimately determine the character of living structures, nor their vital conditions, for chemical examination requires the previous destruction of life. What elements constitute a tissue in a living state is unknown to the chemist, for to examine it he has first to destroy its life, whereby, of course, the tissue experiences a change. The result of examinations made on dead tissues can hence never fall within the compass of physiology, as this is the study of organic structures in a living and healthy state.

Experience teaches us that fruits undergo a much slower and lesser decomposition than meats do, which within a few hours reach the putrefactive stage in the mouth. Experience teaches us that meat is more liable to leave fibers between the teeth than fruits, and bread, correctly prepared, on the contrary scours and cleanses the teeth. Experience teaches us that fruits take more kindly to organic structures, and hence are less liable to irritate than meats; that fruits stimulate the salivary and mucous glands to activity, and produce a refreshing sensation, whereas the more we confine our diet to meat the more repugnant, putrescent, and lax will our mouth become. The secretions will lessen and thicken, the tissues will become indolent and flabby. Experience teaches us that the food and the same saliva do not remain within the mouth from four to thirty hours, but hardly more than thirty seconds; we have, therefore, not to deal with the phenomena exhibited by food kept under the same saliva for thirty hours, but

with those of thirty seconds. Experience teaches us that the most numerous and most ancient nations of the world lived exclusively on fruits, like apples, bananas, maize, wheat, oats, rice, and similar products (not on beefsteaks, mixed pickles, and lemons); that they do not exhibit any effect on the teeth, and that there is not a trace of acid decalcification on the teeth, during or after the mastication of these fruits. Experience teaches us that the mouth will have a sour taste and pestilential smell after carnivorous dishes, but will be tasteless and also free of smell after a meal of fruits; that frugivorian races have the best dentures and are free from decay, whereas the civilized omnivorian classes are the slaves of caries. All these things cannot be observed under the microscope, and yet there is the greatest weight in them.

The lesson contained in the foregoing demonstrates that it is not the absolute amount of acid contained in the food which causes caries, but it is its character and physiological relation which alone come into consideration. Only experience can prove which food is best fitted for man, and it is our pure sense of smell and taste, the absence of after-effects, besides the satisfying feeling of vigor and the final amount of longevity, which recommend a food. All these are competent factors, but they are beyond the sphere of the microscope.

Not the ridiculous doctrines of modern book-worms should guide us, but the invaluable lessons of the world's history, and especially those of cultural history, combined with the immortal dicta of the greatest thinkers and philosophers. These are the sources which prove better than anything else that frugivorian diet prevents caries.

Whoever shall be able to combat one or even more of the sources of caries by any better means than pure hygiene and frugivorian diet may proclaim it to the world, for his advice will be most precious. Should he furthermore be able to cite the greatest thinkers of the world in support of his revelation, it will add to his credit and strengthen his position immensely. As yet, however, it is doubtful if such advice can be brought forward, and where would it find its historical support? But maybe some sage will be so lucky as to discover this arcanum which will do away with caries, although at present the accumulated experience of five millenniums and all common sense are against him.

As has been shown in this paper, it is not at all necessary to lay so much stress upon the activity of the mouth-bacteria, for the reason that their efficiency is entirely frustrated by a strictly hygienic life combined with frugivorism. The discovery that the human mouth is a focus of infection can therefore only in one way be of real value to the world,—viz. by arousing our attention to the fact that this infection by the pernicious activity of mouth-bacteria is totally illusory under the hygienic frugivorian regimen, and that we must strictly follow this regimen to set caries and other diseases at naught. Until now, however, microscopists have believed that they can combat the mouth-bacteria simply by means of antiseptic mouth-washes, although it was long ago known that bacteria can be killed down to the last trace hardly by a boiling temperature. All antiseptic materials, however powerful they may be, are incapable of removing every vestige of sepsis, simply because the antiseptic cannot reach every part of the structure. Besides this, antiseptics create dead organic matter,

which in turn may undergo fermentation as soon as air and moisture are admitted. Moreover, antiseptic mouth-washes are incompatible with an ideal hygiene, for, though seemingly refreshing for the first few moments, they leave the oral tissues in a state of marked relaxation, which pure water never produces. Relaxation is the inevitable sequel of every artificial stimulation. The sacred human body is too valuable to be prostrated artificially in any of its parts, and as long as a sound gastric juice is the only condition under which the body can offer the best resistance to putrefaction we have to discard those means which are of inferior value.

During the last two decenniums much information has been obtained about the life of mouth-bacteria, but however far our knowledge upon this subject has advanced, it is still at this moment not clear whether these organisms have a well-organized state, a queen and an excellent memory like bees; whether they have slaves and policemen like the ants; whether they are animated with the infinity of love as other animals and even flowers are said to be; or whether they even enjoy the benefits of an independent journalism like their enemies, the dentists.

All these details will, however, sooner or later be elucidated, and those who are interested in the matter will be satisfied.

Not so, however, those who think that besides physical injuries there exists only one source of disease,—viz, violation of the hygienic laws of nature, for which there is no exception on earth; either they must be obeyed or the individual has to suffer from disease.

Everything that acts at the expense of health shortens our life, hence we can reversely conclude: those who reach the highest degree of longevity act upon the best hygienic principles, for *success is the teacher of truth*.

Microscopic or germane studies may be adapted to confirm these general hygienic laws, but they cannot upset them, for there is only one kind of truth in the world, and the contradictory half is the wrong one, and must be error. The chief characteristic of hygiene is that she always deals with every organ (hence also with the teeth) as a part of the whole body, and this has established as the basis of all hygienic science, the one sublime law. Local health is dependent upon general health. This is an irrefutable truth, and the system of hygiene, which is founded upon it, excludes mistakes. The value of an antiseptic treatment of the mouth, with disregard of the much more important dietetic and hygienic regimen, is here unmasked as an irrelevant, if not a burlesque accessory.

In an article upon "Mastication in Man," published in the spring issues of the DENTAL COSMOS of 1893, it has been shown that only the correct and natural diet can warrant a general health of the body, and that the earliest authorities insist upon a frugivorian diet for man, as omnivorian habits are implicitly associated with all kinds of disease, among which dental caries is uppermost. Such a view deserves full attention. Dentists ought to investigate in a judicial, scientific manner, which requires physiological experiment of at least fifty years' duration if it is just and true.

It is high time that hygiene received the fullest attention in the dental profession; that all therapeutic and prophylactic methods be tested as to their compatibility with the sublime laws of hygiene; that

hygienic advice be given to patients and to the public in general ; that oral hygiene be regarded as inseparable from general hygiene ; and that dentists be endowed with influence in congressional and legislative bodies, and everywhere where the physical weal of the masses is the object of consideration.

Ultimate results in hygiene, however, do not grow out of observations made on little glass slabs, but out of observations upon the entire man ; and not upon one man, but upon thousands of them ; and not upon the observations of a week or two, but of generations. Only by such extensive researches can scientific results be accomplished, and only through real truth can be found the measure of success.

TREATMENT OF A FRACTURED INCISOR BY ELONGATION.

BY NORMAN S. ESSIG, D.D.S., PHILADELPHIA, PA.

ONE of the most disfiguring accidents that can happen to the mouth is the fracture of a central or lateral incisor (Fig. 1) ; but such a disfigurement may be greatly lessened, if not wholly corrected, by the application of suitable appliances for the purpose of drawing down or lengthening the broken tooth. If the fracture is not more than one-third of the tooth, the broken tooth can be drawn down until the broken edge is on a line with the cutting-edge of its neighbor. A very effective fixture, as shown in Fig. 2, can be used in such a case.

FIG. 1.



FIG. 2.

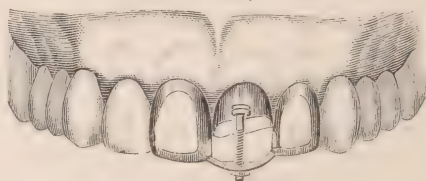


It consists of two caps, enveloping the teeth on either side of the broken one, made of No. 30 gold, twenty-two carats fine, the edges of which are allowed to pass quite up to the free margin of the gum, as described in previous articles on regulation in connection with the screw and cap. The caps are connected by a stout platinized gold

FIG. 3.



FIG. 4.

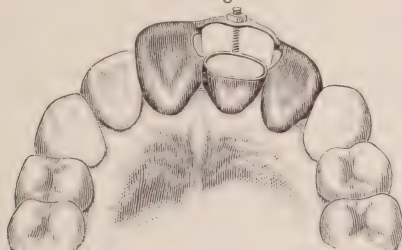


wire, a little curved, so as not to interfere with the downward course of the broken tooth. A hole is drilled in the center of the bar or wire to admit a screw, so as to act upon the fractured tooth, which has a half-cap or band fitting closely around its neck, with a loop or ring soldered on the labial surface, as shown in Fig. 3, to which the

other end of the screw is attached, connecting it with the horizontal bar which unites the caps shown in Fig. 4.

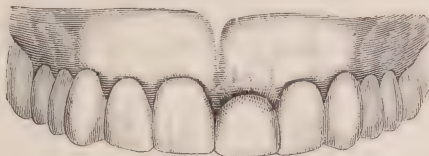
I have recently treated a case of this character where the left central tooth was broken off at a point fully one-third of the distance from the cutting-edge to the neck,—the result of a kick received at foot-ball. The young man, who was about seventeen years of age, had very large well-developed teeth, which is always an advantage in a case of this kind, for if the teeth are larger at the margin of the gum than at the cutting-edge, there may be some difficulty in keeping the caps, upon which a downward pressure is brought to bear, from slipping off.

FIG. 5.



In this case a very good plaster impression was secured, and a thin separating saw passed between the teeth so as to allow the gold to pass well up between them while the piece was being made, and also to insure the passing of the edges of the caps well up to the necks of the teeth. The piece was made in the manner just described, and to avoid too much of a display of gold the labial surfaces of the full caps were cut out, showing but a line of gold around the entire tooth. The patient came every day, and the nut was tightened until the pulling sensation was quite perceptible. In the course of three weeks the broken central was down on a line with the adjoining one.

FIG. 6.



By grinding away the corners of the caps, covering the adjoining central tooth so as to bring its point into view (see Fig. 5), the operator may easily ascertain when the fractured tooth has been drawn sufficiently into line with its neighbor. The fixture was allowed to remain on for some time as a retaining-piece.

One of the interesting features of this operation is, that as the tooth is drawn down, the tissue follows, and, when completed, there is very little more of the enamel of the tooth exposed than before. Care should be taken that the nut be not turned too rapidly, for, though the delicate nerve at the apical foramen will bear a good deal of tension if administered slowly, its vitality might be endangered by

a too rapid application of force. When sufficient time has elapsed, the piece may be taken off, and the broken edge dressed with a fine corundum-wheel and polished with a wood point armed with oxid of tin. Sometimes, if the teeth are long and the break extensive, the adjoining central tooth may be dressed down at the cutting-edge and also polished. In this case, and also two others recently made, the teeth were so nearly restored to their normal condition that the accident is not noticeable in the slightest degree. (See Fig. 6.)

THE IODOFORM QUESTION.

BY GEO. A. MAXFIELD, D.D.S., HOLYOKE, MASS.

THE recent articles in the DENTAL COSMOS by Professor Miller, in the February number, and by Professor Flagg, in the May number, under the above title, appear somewhat misleading in their presentation of facts, and their conclusions are so contrary to the experience of many that it seems to me that a further consideration of this subject is demanded, especially as the authority of these men as teachers can hardly be questioned. That too little attention has been given this drug in dental literature the past few years is evidenced by the fact that Professor Miller at this late day should present a series of experiments with iodoform on agar-agar to prove that iodoform is not an antiseptic. Understanding this subject as he does, I am surprised that he did not give us more experiments in the line of the latest developments, as by the clinical study of the action of iodoform new discoveries were made concerning the processes of inflammation and suppuration. Barely mentioning these discoveries, he passes them by and proceeds by his experiments to "answer the question whether, and under what conditions, iodoform is a valuable remedy in the treatment of diseases of the teeth and surrounding tissues." If in his experiments upon mice he had given us the experiments of De Ruyter, Sanger, and others, proving that when iodoform was established in a wound, if later, anthrax organisms were inoculated, no poisoning resulted, he would have illustrated the importance of using a remedy like iodoform in the treatment of diseased conditions that we find in the teeth and mouth.

The definite facts and conclusions in regard to iodoform that Professor Flagg writes have been taught "for fully eighteen years at the Philadelphia Dental College" are incomprehensible. Such teaching, in the light of the recent discoveries of the action of this drug, that have been confirmed only since 1887 and 1888, would hardly seem to be on a scientific basis. Can we wonder that Professor Miller "proceeds to give Germany and Austria most prominent positions in the early work" of the study of this drug, if this is the method of teaching at one of our most prominent dental colleges, and is not "the decided impression that experiments from a dental point of view were needed at this late date" more firmly established? Professor Flagg emphasizes the fact "that iodoform may be idiosyncratically an irritant." Cannot that be said of every other drug we use? Has not the extensive use of this drug in general surgery established the fact that fewer cases of this kind are encountered than

with any other drug? And why say "as a last resort, as possibly almost marvelously beneficial"? Would it not have been equally as beneficial if used first instead of last? That iodoform has been used in general surgery for many years, constantly growing in favor, and since 1880 has been established as *the* surgical dressing, proves that it has many virtues, that it cannot be lightly laid aside for the many untried remedies that are offered as its substitute. So also it has proven to be of value in dental practice. Clinical experience with iodoform in the treatment of pulpless teeth, putrid canals, alveolar abscesses, antral troubles, etc., has furnished convincing proof of its remedial virtues.

My object in writing this article is to enforce attention to certain truths concerning this drug which science has brought to our knowledge within the past five years. Clinical experience has taught us that we need something besides an antiseptic or disinfectant in the treatment of the different conditions as we find them; that an antiseptic or disinfectant alone may be of little help to nature in overcoming diseased conditions. *It is a fact that ptomaines without the presence of bacteria will cause suppuration, and that the presence of iodoform renders them inactive and prevents the formation of pus,*—iodoform exerting a chemical affinity toward the ptomaines, a new combination results by which the ptomaines are rendered inactive. This proves conclusively the value of iodoform. Iodoform is not an antiseptic, and the knowledge of the fact that it may contain disease-germs, which on its introduction into a wound may be liberated, and thus continue the very conditions we are trying to overcome, teaches the necessity of its careful preparation before using. Undoubtedly the lack of success which many have reported in the use of this drug is accounted for by this very fact. It should be made aseptic.

Iodoform should be washed in a corrosive-sublimate solution before using. In the treatment of alveolar abscesses, if we thoroughly cleanse the parts with a germicide, such as corrosive-sublimate solution and hydrogen peroxid, and follow this cleansing by an agent like iodoform, to prevent the formation of the poisonous chemical substances (ptomaines), or to decompose them and render them inactive if already formed, we shall have every reason to expect a speedy return to healthy conditions. Iodoform acts as a powerful deodorizer, because of its power to destroy the ptomaines. In filling root-canals after they have been thoroughly cleansed with germicides, what better dressing can we use than iodoform? The more putrid the condition found in these canals, the greater the necessity for using this drug.

Reference to the poisonous effect of iodoform—iodoform intoxication—has been made in the two articles referred to. In 1885, von Mostig-Moorhof reported over eleven thousand cases treated with iodoform, without a single case of poisoning. This in general surgery. The small quantity possible for us to use in our specialty, it is safe to assume, will never be sufficient to cause any evil results, though it is well to bear in mind that there is a limit beyond which we cannot go, as with aconite, carbolic acid, or in fact with any or all the drugs we may use.

If "science may be somewhat late with its 'agar-agar' work to presume to tell us now" what through study of the drug it has dis-

covered within the past five years, many members of the dental profession in America, with their patients, are under great obligations to foreign scientists for this knowledge, which has proved of inestimable value.

CORRESPONDENCE.

MIXTURE OF NITROUS OXID AND OXYGEN.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—In reply to the letter from Dr. Frederic Hewitt, in your issue of July, 1893, permit me to say that Dr. Hewitt is in error to suppose that I have any results in opposition to his. I have not collected any clinical facts in regard to the subject of nitrous oxid and oxygen, as he would seem to infer, but have simply made a series of experiments upon the lower animals, not for the purpose of determining whether the mixture is a practical anesthetic in man, but for the purpose of making out if possible whether nitrous oxid acts by shutting off oxygen or another way. The following quotation from my paper will show that my theory is not in opposition to Dr. Hewitt's views ; while it is a fact that I have never administered nitrous oxid, either with or without oxygen, to a human being :

"The results which I have reached in this paper indicate that theoretically it is possible to get a mixture of oxygen and nitrous oxid which will contain sufficient oxygen to maintain for a length of time the vital function, and yet have so little oxygen that consciousness would be lost."

The large experience of Dr. Hewitt should certainly lead to a widespread practical test of the matter upon human beings.

H. C. WOOD.

PHILADELPHIA, PA., July 12, 1893.

HOTEL EXPENSES IN CHICAGO.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—From letters received from dentists in different parts of the country, I am inclined to think that there is a lack of information as to the expense of living in Chicago during the season of the World's Fair. Board and lodging were never more reasonable than now. Rooms can be had, where two are willing to room together, for fifty cents a day each. First-class rooms and accommodations can be had from a dollar to a dollar and a half per day, when parties wish to room alone. The highest-priced hotels are entertaining people for five dollars per day, room and board. For twenty cents, in restaurants just outside of the fair grounds, will be furnished three eggs, a cup of tea or coffee, and all the bread and butter one wants. For thirty-five cents can be had a good, well-cooked steak, potatoes, tea or coffee, and bread and butter.

The boat, railway, and street-car companies are doing all in their power to furnish the best and cheapest transportation possible.

Of course there are a few catchpenny schemes, but they are not

in connection with the responsible hotels or the fair. Considering the size of the Exposition, the number is remarkably small.

I have made this investigation for the purpose of informing the dental profession of the exact facts concerning the expense here, and would urge upon every one to remain as long in Chicago as possible. A month or six weeks can be profitably spent in seeing what the world has done and is doing, and a longer time may be used to great advantage. This can be done by stopping at a moderate-priced hotel.

The information I have thus briefly given may not be necessary to every one, but I am quite sure that it will be useful to many who have been misinformed as to the expense.

J. N. CROUSE.

CHICAGO, July 7, 1893.

TRANSLATIONS.

ON THE ETIOLOGY AND PATHOGENESIS OF DENTAL PERIOSTITIS.

BY DR. EMIL SCHREIER, VIENNA.

(From the Institute of Pathological Histology and Bacteriology. Professor A. Weichselbaum.)

THE following is a report upon a series of bacteriological researches which I have undertaken upon the inflammatory product found in this disease, particularly upon the substances taken from the focus of the morbid processes. Authors are agreed that this disease, as well as pulpitis, which I have included in my researches, is of infectious origin, and that in the vast majority of cases the carriers of the infection reach the periosteum by the root-canal. As regards the nature of the exciter itself, however, I was not able to find any accurate data. The latest researches on this subject confine themselves to simple determination regarding the diseased or putrescent pulp as the commonest source of infection.

It is, indeed, sufficiently well known that the most varied forms of micro-organisms, pathogenic as well as harmless, are found in a putrescent pulp. The presence of the former especially has been shown by Miller to occur through cultures, and particularly through experiments on animals. It seemed to me very desirable, as Miller, Arkövy, Nessel, Rothmann, and others agree, to discover which of the various forms are related to the above-mentioned disease, whether only pathogenic species and which ones, or also saprophytic. Miller, whose book, of course, served as the point of departure for my work, expresses himself in the chapter headed "Gangrenous Pulps as Foci of Infection" as follows: "The infection of the periapical tissue is usually occasioned either by the micro-organisms working their way into it independently from the pulp, or by the mechanical forcing of infected material through the foramen apicale."

In other parts of his book, however, to which I will return later, he calls attention to the influence of bacilli of decomposition in this inflammation, and finally he describes a large series of pathogenic micro-organisms which can be cultivated whose relations to diseased processes in man are entirely unknown. It is easy to understand that a large series of questions are entirely unsolved whose solution is of great importance for the comprehension of this infection, furthermore

for dental practice as a whole. In order to gain a closer insight into this question, it seemed to me simplest to search for the carriers of the infection at the foci of the inflammation itself. Accordingly, I have chosen material for my researches in the inflamed periosteum, in sub-gingival abscesses, and further at the root-pulp and the periosteum of teeth which showed symptoms of pulpitis. This is the method employed in pathology in seeking the exciter of a diseased process whose infectious character is probable from the etiology and the symptoms. Examination is made, first, of the focus of disease and the products formed by the process, or any micro-organisms which may be found therein. Second, cultures are made with these products. Third, these cultures are examined for their virulence by inoculating animals susceptible to the species isolated in cultures.

My researches are, to a certain extent, incomplete, in that the condition of the second postulate stated was alone fulfilled. I have omitted the demonstration by the microscope of the presence of the organisms in the material selected for making the first cultures, because obtained from the source it was, against which no objection could be brought, it was naturally small in quantity, so that I was compelled to use all at my command for the culture-experiments. Microscopic examination, except in the use of a small number of well-marked forms, is unsatisfactory for the determination of the species. This latter determination was the objective point with me.

I was further able to omit the examination of the pure culture as regards these pathogenic influences on animals, for the reason that only such as had been adequately studied in this regard were discovered by me. The entire unanimity in the results of my cultivation, and the sufficiently low number of cases examined, seem to exclude every objection of inaccuracy that could be justly brought forward. The procedure employed consisted essentially in examining twenty promiscuously selected cases of periostitis and pulpitis for the presence of micro-organisms, and subsequently in making pure cultivations of those found. The special method of research and the results in each individual case obtained will be given in detail. I think it imperative to consider each case separately, and to append the clinical history, for the reason that there will be found among them some, the analysis of which makes it possible to draw a series of new and important conclusions for our specialty.

I.

Mr. B., age thirty-five. Bicuspid, first left lower ; periostitis. The tooth came under my care six months previously, for pulpitis, and at the second sitting, after extraction of the pulp, destroyed by arsenic, was filled with cement. The root-canal was closed with a carbolized plug of cotton. During the treatment a noteworthy phenomenon struck my attention, which I was unable to explain at the time. Whenever the "nerve-needle" had penetrated about seven mm. into the root-canal, severe pain was complained of, which vanished on pushing the needle farther in. After the second day slight sensitiveness of the tooth, no swelling, no suppuration. Local abstraction of blood by incision caused the symptoms to vanish in one day. The tooth remained entirely quiet until two days ago, when severe pain occurred at night, which, except for short intervals, has persisted.

Present Status.—A hard, non-fluctuating swelling, about the size of a hazel-nut, painful on pressure, covered with the inflamed and reddened gum, situated on the buccal surface of the lower jaw, corresponding to the site of the tooth. The mucous membrane covering the swelling was washed with a solution of sublimate, rinsed with alcohol, a Pravaz syringe inserted and pushed to the bone. About three drops of a sanious, serous fluid was obtained by aspiration. About three cc. of sterilized water were drawn up in the syringe, the entire contents were emptied into a sterilized vial and preserved for examination. The swelling was incised, and the patient directed to return next day.

Microscopic examination under colored, dry, cover-glass preparation failed to show the presence of micro-organisms. Six oesen* of the fluid were then grafted in the usual way to form cultures on agar plates, and at the same time the contents of an oese were spread on glycerol agar plates in test-tubes. The plates were examined after forty-eight hours, with the following result: On the first plates appeared numerous very minute and delicate colonies, of which the superficial layers showed a white center with an extremely delicate transparent border, while the deeper layers presented the appearance of very small grayish-white points. Under a magnification of one hundred, small twisted or tendril-like formations were visible. On the remaining plates similar colonies appeared in correspondingly smaller proportions. Examination of the stained specimens showed the presence of small cocci, some round, most of them lancet-shaped; the cocci were in pairs or in short chains. Various culture-media were inoculated with the colonies. The bacteria grew quite luxuriously on agar in the deeper portion of the track of the inoculating needle, but no growth took place on the surface. In meat-broth a slight degree of cloudiness was observed, and a distinct precipitate. No growth took place on gelatin or potato.

Of the first inoculations on agar about sixty colonies had sprung up; these were extremely small, very delicate, and had the appearance of minute drops of dew lying on the surface of the agar. Microscopic examination of the stained specimen and subsequent inoculations on different media gave similar results.

The second generation of cultures in meat-broth were inoculated into two mice,—intrapleural in one, intraperitoneal in the other. The latter died in sixteen hours. Numerous round and oval cocci in pairs or short chains were found in the blood and in the scanty exudate found in the abdominal cavity. Capsule formations could not be discovered. The other mouse showed symptoms of disease, but recovered. According to the above reactions, the bacterium was determined to be the *Diplococcus pneumoniae*.

The patient returned the following day and earnestly requested that the tooth be extracted. This was done with the employment of all possible precautions, so that the material could be used for further examination. The method was as follows: The surrounding mucous membrane was washed with sublimate, then rubbed with alcohol and

* *Oese*. A platinum wire bent into a small loop at one end, and fixed into a glass handle by the other; used in culture-experiments on micro-organisms.
—Billings.

ether, and care was taken during extraction that nothing should rub against the tooth. The periosteum showed an exudate of the size of a lentil at the apex of the root, having the form of the structure usually described as the pus-sac. This was cut off with a pair of scissors which had been sterilized by heat, was placed in sterilized water, then washed, and portions of it removed for inoculation of the agar plate cultures as described above. The plate cultures and subsequent cultivations gave the same result,—the presence of the *Diplococcus pneumoniae* alone. On splitting the tooth, it was found that an extremely narrow lateral canal extended out from the root-canal about four mm. from the apex; this canal was visible as a narrow gutter in the root, and contained remains of pulp tinged with blood. This abnormality was manifestly the cause of the pain experienced on probing the canal, and mentioned above.

II.

Pulpitis.—I was unable from my researches to make out a differentiation of the various forms of this disease. In this and the following case the diagnosis was made from the symptoms. I mention specially, pain on probing the carious cavity, and sensitiveness on percussion of the diseased tooth. The material for cultivation was taken in some cases from the periosteum, in others from the root-pulp; the latter showed no changes macroscopically.

In the following case the second upper bicuspid of the left side was affected. The tooth was extracted with the necessary precautions, wrapped in cotton moistened with a five per cent. solution of carbolic acid, and laid aside. After two hours (it is to be mentioned I had to carry the material from my operating-room to the laboratory, which was situated at a considerable distance) the specimen was rinsed with sterilized water followed by alcohol and ether, the root was split lengthwise, the root-pulp needled with the platinum needle, and the first agar tube inoculated therewith. The cultures were made as previously described with the material thence derived. At the same time some of the original material was spread on the two glycerol agar tubes. The result exactly as in No. 1. Inoculation on animals not made.

In all of the remaining cases I abstained from using plates for cultures, because from the results first obtained it appeared probable that the *Diplococcus pneumoniae* would more frequently occur, and it not rarely happened that this bacterium would not grow on the plate. Accordingly, a method was employed which, as I shall presently detail, proved satisfactory in that its results were unobjectionable, obtained with much less trouble and with less danger of vitiation from contamination from outside sources.

As much of the material to be examined as could be contained in a scoop was spread at once in my office on glycerol agar, which was ready at hand. Where the material was more abundant the contents of a scoop was divided between two tubes, for the sake of dilution; in addition to the layer spread on the surface, an inoculation was usually made with the needle, to allow development within the mass. The inoculated tubes were placed in the incubating oven for forty-eight hours. The colonies were always situated at a sufficient distance from one another to permit independent inoculations therewith with cer-

tainty. Specimens were first selected for microscopic examination from such colonies as presented different appearances even to the naked eye. The individual colonies were then transplanted upon the usual culture-media, and the species thence determined.

III.

F. E., age twenty-four years. A fluctuating swelling about the size of a hazel-nut, slightly painful on pressure, situated on the surface of the cheek of the left side, at a point corresponding to the first bicuspid; this swelling made its appearance a few days ago without much disturbance. The pulp of the tooth was gangrenous. Incision with a bistoury sterilized by heat evacuated about ten drops of a greenish-yellow odorless pus.

The pus adherent to the knife was spread on glycerol agar; about seventy colonies sprang up, each the size of a millet-seed. Microscopic examination showed the presence of cocci arranged like a bunch of grapes. The bacteria grew on all culture-media at the ordinary temperature of the apartment, forming a light gray mound on agar, a white deposit on potato. Needle inoculations in agar were successful in the track of the needle, as well as on the surface. Meat-broth showed a uniform cloudiness; the sediment remained white. Cultures made with the needle in gelatin caused the medium to become fluid rapidly, with cloudiness of the mass. The sediment, however, remained white. Accordingly, the determination of *Staphylococcus pyogenes albus* was made.

IV.

Mr. M., age forty-five years. First superior molar on the right side. All the other teeth of this half of the upper jaw absent except the last molar; alveoli largely absorbed; distal portion carious; pulp gangrenous. Periostitis, no swelling visible, no suppuration. Extraction of the tooth. Inoculation of material from the reddened periosteum with the platinum scoop on agar.

Result: Twelve successful colonies. Microscopic examination and reinoculation give the same results as in III (*Staphylococcus pyogenes albus*).

V.

Mr. K., age forty-three years. Decided swelling of the entire half of the right side of the face; starting-point, first superior molar of right side; pulp gangrenous; suppuration not well made out; extraction. Inoculation on agar, with the scoop, of material from the angle between the roots. After forty-eight hours, about one hundred colonies, very minute and delicate, made up of identical species, were noted. Examination showed small, partly round, partly oval cocci, arranged in pairs or in short chains. A fairly luxurious growth deeply in the track of the needle on agar, but none on the surface. Meat-broth showed at the expiration of forty-eight hours a slight cloudiness, and a decided but not abundant precipitate. No growth on gelatin.

The same result was noted in almost all of the other cases, except, perhaps, that in addition to the short chains of cocci somewhat larger ones also occurred occasionally, or that the majority of the cocci were roundish; both of these conditions were especially marked in meat-

broth. The above characteristics indicate the presence of *Diplococci pneumoniae*. The formation of longer chains alone constitutes a departure from the typical,—a variation, however, as shown by later researches, which occurs not infrequently in the case of the *Diplococcus pneumoniae*, and is only to be regarded as a variety of that species.

In order to determine the length of time during which the cultures are inoculable, the latter were preserved in this and the following cases from nineteen to twenty-four days at the ordinary temperature of the apartment, and at the end of that time transplanted to a fresh medium. In every case growth took place in agar, although somewhat less luxuriously than in the first generation. This occurrence does not certainly negative the presence of the *Diplococcus pneumoniae*. The inoculability of the latter has been found to be as preserved, in numerous instances, for a longer period than was formerly assumed. Further transplantation of the later generations to meat-broth and gelatin gave the same results as before; that is, more or less marked turbidity in the broth, with a scant precipitate, and uniform failure to grow in gelatin. The conclusion was thus entirely justified that we were dealing in this and the following cases with the *Diplococcus pneumoniae*. At all events, it cannot be assumed, in spite of the occasional presence in the cultures of somewhat longer chains, that the growth was *Streptococcus pyogenes*, for the reason that growth never took place in gelatin. As already mentioned, this coccus was found, in almost all of the following cases, either alone or with *Staphylococcus pyogenes*. I shall, therefore, in order to avoid repetition, hereafter omit the method employed for the determination, and only mention the species found.

Staphylococcus pyogenes was determined as in III, the formation of pigment, of course, being taken into account.

VI.

Miss N., age twenty-five years. For the past two days severe pain above the root of the first right bicuspid. Six weeks ago a Logan crown was adjusted to the root with gutta-percha. Moderate swelling, filling the space of the canine fossa; the gingiva congested, the root sensitive to pressure. No fluctuation. Incision to the bone opposite the apex of the root. The ichorous matter on the bistoury inoculated on agar. Result negative (sterile).

On the following day the pain was less severe, the wound of incision closed. On the next day following, decided fluctuation over the apex of the root; incision repeated, evacuating a brownish granular pus. Inoculation from the bistoury on agar. Result, numerous colonies (about sixty) of *Diplococcus pneumoniae*.

VII.

Girl, age twenty. Pulpitis; first left upper bicuspid. Extraction. The periosteum reddened at a distance of about three mm. from the apex of the root, in the form of a narrow ring. Two tubes were inoculated, one from the reddened part of the periosteum, by scraping with the scoop; second, from the divided root-canal by mashing the root-pulp with the wire. Result: I, remained sterile; II, about twenty

colonies appeared, presenting two characters,—*a*, larger ones, and *b*, smaller ones :

- (*a*) *Staphylococcus pyogenes albus*.
- (*b*) *Diplococcus pneumoniae*.

VIII.

Mr. B., second left lower molar. Pulpitis. Extraction. Periosteum reddened. Inoculations from—

I. Periosteum.

II. Root-pulp of distal root.

From I, numerous larger colonies, presenting the same appearance, and about fifteen smaller and delicate ones, partly intermingled with the previous and partly (four) entirely isolated. The larger colonies, *Staphylococcus pyogenes albus*. The small colonies (inoculation was successfully performed with the intermingled colonies also), *Diplococcus pneumoniae*. II, remained sterile.

IX.

Girl, age twelve. Pulpitis ; first left lower molar. Inoculation from periosteum. Growth of two species of colonies :

- 1. Very numerous, small, delicate.
- 2. Smaller number (about one-quarter), larger, firmer.

I. *Diplococcus pneumoniae*.

II. *Staphylococcus pyogenes albus*.

X.

Woman, age twenty-five. Pulpitis ; second left lower molar. Extraction from the root-pulp of the distal root on agar. Growth of about twenty small delicate colonies. Result, *Diplococcus pneumoniae*.

XI.

Dr. H., age thirty. Gingival fistula of root, of many years' standing, starting from the root of second upper right bicuspid. Disinfection with sublimate, then alcohol ; one drop evacuated by pressure. Inoculation with the scoop on agar. Growth of two species of colonies in like number, about thirty.

I. *Staphylococcus pyogenes albus*.

II. *Diplococcus pneumoniae*.

Inoculation from apex of root after extraction gave the same result.

XII.

Woman, age twenty-eight. Root of the left upper small incisor filled six weeks ago, with replacement of the tooth. Periostitis, with marked swelling of the face ; distinct fluctuation.

(*a*) Incision evacuated about thirty drops of pus tinged with blood.

(*b*) Extraction of the apex of the root. Inoculation with the scoop on agar.

(*c*) Inoculation from the divided root-canal on agar by means of a thread saturated with oil of cloves.

(*a*) Twelve colonies of *Diplococcus pneumoniae*.

(*b*) About one hundred colonies, considerably larger than those of *Diplococcus pneumoniae*, and gradually taking on an orange-yellow

coloration. On reinoculation on glycerol agar and potato, similarly colored (orange-yellow) cultures also appeared; rapid liquefaction of gelatin, the sediment being orange-yellow in color. Microscopic examination showed cocci arranged in small heaps. Accordingly, determination, *Staphylococcus pyogenes aureus* was made. Five colonies of *Diplococcus pneumoniae*.

(c) Remained sterile.

XIII.

Lad, age fifteen years. First right upper molar. Pulpitis. Extraction. Inoculation from the periosteum of the apex of the root, resulting in the growth of about thirty small, delicate colonies,—*Diplococcus pneumoniae*.

XIV.

Girl, age seven years. First left lower molar. Pulpitis. Extraction. Inoculation from periosteum, resulting in the growth of about fifty colonies of *Diplococcus pneumoniae*.

XV.

Mr. J., age twenty years. Second right lower molar. Pulpitis. Inoculation from root-pulp; few colonies, and only in the track of the inoculating needle. *Diplococcus pneumoniae*.

XVI.

Mr. W., age forty-five years. Second right lower molar; taken under treatment for pulpitis totalis. Distal caries; crown-pulp in a purulent condition at the distal cusp. Treatment with arsenic. Two days later the root-canals were cleansed, cavity filled with gutta-percha.

The patient returned at the end of five days, complaining of constant though not severe pain situated deeply in the jaw. No swelling. Removal of the temporary filling with coffer-dam; probing of the distal canal evacuated about ten drops into the cavity; of this one scoopful on two agar test-tubes—

I. A connected group of *Staphylococcus pyogenes aureus*.

II. About seventy distinct colonies of this same bacterium.

XVII.

Woman, age twenty-five years. First left lower molar. Pulpitis. Extraction. Inoculation from periosteum. About forty colonies of *Diplococcus pneumoniae*, five colonies of *Staphylococcus pyogenes albus*.

XVIII.

Gentleman, age forty years. Periostitis; second left upper molar. No swelling. Pulp suppurating, no odor. Extraction. Inoculation from periosteum. About fifty colonies of *Staphylococcus pyogenes albus*.

XIX.

Subgingival abscess of lower jaw the size of a pigeon's egg, starting from first molar. The tooth had been filled with a large, well-placed amalgam filling. Incision, evacuation of a thin, granular, brownish, odorless pus.

Inoculation from the bistoury on agar, resulting in about eighty colonies of *Diplococcus pneumoniae*. The tooth was extracted two days later. The periosteum was found to have undergone degeneration into a cheesy mass, occupying the entire interspace between the roots. Longitudinal fracture showed that the amalgam filling occupied the pulp-chamber. The root-canals had not been penetrated by the filling, but were empty, the parietes covered by a moist, black, odorless deposit, the dark coloration evidently derived from the amalgam. Inoculation with this deposit on agar remained sterile. The tooth had been filled six months previously, and had never caused any pain, and the swelling had developed in the course of the last month without much pain.

XX.

Mr. Sch., age twenty. The left upper large incisor had been filled with cement at both approximal surfaces. The fillings had been done a year and a half ago, closing the cavity completely. Periostitis, moderate swelling, no fluctuation. After sterilization, an opening was drilled into the tooth on the lingual aspect. Upon opening the pulp-chamber a thin, granular pus was evacuated through the drill-hole.

Inoculation therewith on agar, about seventy small, delicate colonies appeared. Microscopic examination showed round cocci arranged in short and longer chains. Growth only in the track of the inoculating needle, none on the surface. Meat-broth hardly cloudy, but abundant precipitate (sediment), consisting of long chains. Well-marked growth in the track of the needle on gelatin, also on the surface, presenting the form of a delicate veil (*Streptococcus pyogenes*).

In all of the cases examined by me, three species alone were found, — viz. *Staphylococcus pyogenes*, both *aureus* and *albus*, and *Diplococcus pneumoniae*. I wish to lay special stress on the circumstance that no other species ever appeared in the cultures, which might have been regarded rather arbitrarily as an accidental contamination, to be left out of account. The almost constant occurrence of the *Diplococcus pneumoniae* is remarkable. As regards this fact, results obtained by Nannotti (*Lo Sperimentale*, xlv, 1891, Nr. 12) are perhaps to be mentioned. Of the four abscesses, two were conjoined with carious teeth, — namely, an abscess the size of an orange in the left lower jaw, and a peridental abscess as large as a hazel-nut within the right upper jaw. I shall consider the signification of this later.

Little astonishing as it may be that I should have found in inflammatory processes which, in the majority of cases, lead to suppuration, the presence of bacteria which are known to be the exciters of inflammation elsewhere, nevertheless I ascribe a certain special signification to my results. It is apparent, in the first place, that the exposed pulp, particularly of the root, is a frequent point of entrance for micro-organisms of decidedly pathogenic character, whose connection with the most various and severe affections, such as phlegmon, endocarditis ulcerosa, osteomyelitis, meningitis, and pyemia, has been placed beyond doubt.

Every pulpitis and periostitis results from infection by micro-organisms of such a character as are capable under favorable circumstances of causing most serious injury to the human organism. Even if it be hardly ever necessary in any particular case, upon the determination

of the special cause, to refer to the teeth as the point of initial invasion, the presence here of these organisms deserves to be noted.

As concerns our specialty, however, the results obtained by me permit a closer approach to the consideration of a whole series of important questions whose solution, from a theoretical point of view, has not always been attempted in the happiest manner.

Infection of the pulp and periosteum becomes intelligible at once, and the source of infection is apparent. The exposed pulp is a solution of continuity, a wound which, like every other wound, is liable to infection. Such infection may occur at a time when the structure may be still covered by a layer of dentine; it need only be assumed that the latter is penetrable by the specific carriers of the infection. On the other hand, infection may not occur even if the pulp be exposed to a great extent; or it may still occur in cases where the pulp has become, through external, mechanical, chemical, and similar influences, entirely or partly necrotic, and at a later stage gangrenous. My researches further prove that there is no justification, in the present status of our knowledge of the subject of caries, in assuming that the carious dentine is itself the cause of pulpitis, as Nessel* maintains, and as v. Metnitz† believes he has proved from his researches on sections of carious dentine, stained to show the presence of micro-organisms. Such an assumption could only be justified if participation in the carious process by exciters of pus has been proven. Such participation, although in itself quite possible, was not, so far as I know, even suspected. Just as little does the process which is denominated gangrene of the pulp stand as such in any causal connection with periostitis. The latter can only occur when, in addition to the various forms of micro-organisms which may be found in the putrescent mass, virulent exciters of suppuration are also present. In the majority of cases these will not be absent, for the preceding necrosis of the pulp, which is indispensable for the occurrence of gangrene, is probably most frequently caused by a pulpitis, an infection with pyogenic elements. If the latter, however, are not present, according to Miller the gangrenous pulp is at times entirely free of living bacteria, or shows only the presence of saprophytes, a gangrenous pulp will be found to be a pretty harmless occurrence.

We conclude further from the above researches that with antiseptic treatment of the root-canal, no regard is to be paid to spores which, according to Miller, may be present in the putrescent mass, seeing that the bacteria which determine the affection do not form spores, although staphylococci possess decided powers of withstanding the most varied influences. It also follows, as is otherwise well known, that pulpitis and periostitis are processes which can directly pass into each other. The irritation of the periosteum occurring in pulpitis, the congestion present at the apex of the root of the extracted tooth (hyperemia periosteo-dentalis symptomatica, Nessel), is the expression of an infection of the periosteum, and therefore no hyperemia; rather an inflammation, for we succeeded in almost every case in cultivating the specific exciters from material thence obtained.

As in inflammation occasioned elsewhere by the same microbes, we

* Nessel: Periostitis Dentalis, in Scheff's Handbook.

† Oestr.-ungar. Vierteljahrsschrift für Zahnheilkunde, 1893, p. 10.

found here also that the territory occupied by the organisms was in the beginning of the inflammation far more widespread than the extent of the subsequent suppuration. This fact is of great significance in practice. Nessel develops at greater length that in those not so very rare cases in which a lethal result occurs from pyemia following extraction, on account of periostitis, the practitioner may, perhaps, be unjustly accused of having caused infection by operation, whereas the field of operation may have been septic already. My researches show that the same conditions obtain in pulpitis. Among the cases examined by me were four of periostitis, originating in teeth which had been treated for a varying period of time, from six weeks to one and a half years prior to filling. Miller considers this frequently noted circumstance at length in his work ("Mikro-organismen der Mundhöhle," II Aufl., p. 87), and gives the following explanation:

"In such instances, we have to do with cases where small remains of the pulp were left behind at the time of treatment, and which remained sterile in consequence of the antiseptic employed at the time. As the antiseptic in process of time began to lose its power, and bacteria were anew carried to the apex of the root *by the circulation*, decomposition of these pulp-remains set in, leading to the symptoms above described."

This explanation will satisfy no one; the search for an analogous example in the whole domain of pathology is vain. It is much more simple to assume that at the time these teeth were treated the infectious substance was left in the root-canal, and that the pyogenic bacteria present therein did not become possessed of the opportunity until later to develop their noxious influence; be it that for any cause they increased in numbers or their virulence itself became augmented. It may also be reasonably assumed that these but slightly virulent bacteria might maintain a condition of chronic inflammation for years, which for some unknown reason undergoes exacerbation, and calls forth the phenomena of an acute periostitis. The expression of chronic inflammation of this character are the cystoid formations so frequently found at the apex of the root.

Of the four cases examined by myself, we find such periosteal growths in Cases I and XIX. Case XII was one of mixed infection with *Staphylococcus pyogenes aureus* and *Diplococcus pneumoniae*, a circumstance which renders the occurrence of infection in the manner described by Miller as improbable in itself. In Case XX, finally, we must assume that *Staphylococcus pyogenes* was left locked in a cavity imperfectly prepared; the carious process, not having been arrested by the filling, finally exposed the pulp, and this became infected by the bacteria, and thus occasioned the appearances described.

If we regard the above-mentioned cystoid formations at the apex of the root as abscesses which have become encysted, the enigmatical infection becomes a much simpler and easily understood occurrence, having numerous analogues in general pathology. We know that such encysted abscesses may be seated in the most important structures without occasioning the slightest disturbance, and that, after years of latency, they may suddenly give rise to the most severe symptoms.

The almost constant participation of the *Diplococcus pneumoniae* in the causation of the inflammatory process renders a number of the clinical phenomena of these affections more intelligible. The frequent

presence of this bacterium in the human mouth reveals the source of the infection, and the varying intensity in its virulence easily explains the varying degrees in the severity of the process.

In making this statement, I have, of course, no intention of denying the significance of the anatomical conditions in any particular case. One circumstance is deserving of special note; this is the influence of "catching cold" on the occurrence of this affection. Of the many thousands who call upon the aid of the practitioner for pulpitis and periostitis, the vast majority ascribe their malady to the influence of cold. Similarly, most patients with gingival fistula declare that every increased secretion therefrom is called forth by the same cause. According to my researches, we cannot deny that this view is, to a certain extent, well founded,—seeing that in other diseased processes dependent upon the *Diplococcus pneumoniae*, especially pneumonia, the influence of cold must be regarded as a frequent and important element in the causation.

While it is not permitted to draw general conclusions applicable to all cases from a comparatively small number of observations, nevertheless, in view of my results and their agreement with the well-known facts of pathology, I feel justified in drawing the following conclusions as highly probable:

1. Pulpitis and periostitis are processes which are caused by infection with bacteria, the exciters of suppuration.
2. The most usual exciter of these affections is the *Diplococcus pneumoniae*.
3. The *Bacillus pulpæ pyogenes* described by Miller, and the pure cultivations of micro-organisms pathogenic for animals, obtained by this observer and others from the cavity of the mouth, are scarcely to be considered in the pathogenesis of pulpitis and periostitis.

In making this statement, I do not wish to be understood as denying the universally accepted possibility that the most varied forms of carriers of infection (I mention especially actinomycosis) may enter the organism by way of the pulp and the periosteum.

It would not have been possible for me to carry on my researches if Professor Weichselbaum had not most kindly placed at my disposal the equipments of his laboratory. I wish to express to him my warmest thanks for his kindness in this respect, as well as for his great kindness in the aid he extended me in every way for carrying out my labor. I also am under many obligations to Dr. Schlagenhauser, adjunct in the laboratory. His advice and the many useful suggestions which he cordially extended to me were of great help in my undertaking.—*Oesterr.-ungarische Viertelj. für Zahnh.*, April, 1893.

PROCEEDINGS OF DENTAL SOCIETIES

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Continued from page 559.)

FIRST DAY—*Continued.*

DR. GEORGE V. I. BROWN, of Duluth, Minn., read a paper on "Practical Oral Therapeutics," an abstract of which follows:

PRACTICAL ORAL THERAPEUTICS.

Having in charge the natural gateway of the whole wonderfully complex system of human mechanism, we are familiar through experience and the frequent statements in medical and dental literature with the fact that inflammations having their exciting irritation in the mouth often cause, by reflex action, severe neuralgic pain in the eye, ear, different parts of the head, face, and neck, or wherever connection can be found through the many ramifications of the fifth nerve and its ganglionic associates; that in the same manner also sometimes originate diseased conditions of a very serious nature in the eye and ear, as well as spasmodic affections of the muscles, lock-jaw, convulsions, epileptic attacks, paralysis, nervousness, and indigestion; and that, too, there are in contradistinction to these another class to which belong the infectious diseases of the oral cavity itself, and those that are caused by the migration of pathogenic micro-organisms from the mouth to other parts of the body.

Miller, in his "Micro-Organisms of the Human Mouth," considers the diseases caused by the pathogenic bacteria of the mouth under six heads, according to the point of entrance of the infection, and it is this classification which I shall follow in discussing their treatment.

First. Infections caused by a breach in the continuity of the mucous membrane by mechanical injuries (wounds).

Second. Infections through the medium of gangrenous tooth-pulps and from alveolar abscess.

Third. Disturbances conditioned by the resorption of poisonous waste products formed by bacteria.

Fourth. Pulmonary diseases caused by the inspiration of particles of slime, small pieces of tartar, etc., containing bacteria.

Fifth. Excessive fermentative processes, and other complaints of the digestive tract, caused by continued swallowing of microbes and their poisonous products.

Sixth. Infections of the intact soft tissues of the oral and pharyngeal cavities, whose power of resistance has been impaired by debilitating diseases, mechanical irritation, etc., considering in this connection also the possibilities of infection by the accumulation in the mouth of the excitants of diphtheria, typhus, syphilis, and diseases of like nature.

Of the affections not caused by pathogenic bacteria, by far the greater number are the result of an inflammation of the tooth-pulp, discussion of the treatment of which in all the variety of opinions so frequently brought forward by the enthusiastic adherents of each would of course be quite beyond the possibilities of this paper; therefore I will simply state that in this opinion, while fully recognizing the important value of the pulp in a healthful condition, once it has been irritated by exposure to external influences and afterward covered by a capping, it must always afterward be looked upon as a source of danger and a menace to the associated parts, unless the circumstances be so favorable that success is assured.

By the careful destruction and removal of the contents of the pulp-chamber and canals, the thorough cleansing with antiseptic measures, and the filling of the roots with gutta-percha, inflammations of this character may be promptly and efficiently relieved.

The toxic properties of the human saliva have been noticed by

observers since the earliest times, and the experiments of modern biologists have fully borne out the truth of their reports.

Fatal results attendant upon the bite of persons, and the death of animals injected with human saliva for the purpose of experimentation, have been explained, as we all know, by the transmission into the circulation of the omnipresent pathogenic bacteria of the mouth.

Of primary importance, then, must be the care of our hands and instruments. Fatal septicemia, pyemia, and the transmission of syphilis through accidental wounding of the mouth with infected instruments, are too well understood to need more than a passing reference here.

In my own practice, it is my custom to keep a small jar of one one-thousandth preparation of bichlorid of mercury upon the operating-table, and I have given myself the habit of dipping into it my mouth-mirror and every instrument that I use before putting it into the mouth. One has the comfortable feeling that an instrument subjected to the corroding influence of bichlorid, and then wiped so thoroughly that it does not corrode, is at least mechanically cleaned, even if the action of the germicide might be questionable in so short a period of time.

In using instruments upon the soft tissues and upon the bony structures, I take the additional precaution of an open flame, because even if there be damage to the temper of the instrument, it does not seriously unfit it for use in this manner.

The care of the necks of the teeth, and that most obstinate affection at the gingival margin known under the various names of pyorrhea alveolaris, Riggs's disease, phagedenic pericementitis, etc., on through a variety of different appellations, each, however, signifying a chronic suppurative inflammation of the periosteum, accompanied by an inflamed condition of the gums, and more or less affection of the alveolar process.

Undoubtedly there are constitutional predisposing conditions which are largely responsible for the frequency and obstinacy of this trouble; but there seems to be such a diversity of opinion, and so many different constitutional disorders are given as predisposing causes, that we are forced to the conclusion that the subject is but little understood. For instance, some writers put it in the category of bone-diseases, others ascribe its cause to wasting diseases, while rheumatism, gout, scrofula, malaria, tuberculosis, rachitis, and a host of others have each been brought forward as the cause. Some investigators claim to have proven it to be the result of a specific bacterium, and to have separated pure cultures which in turn would produce a similar affection in animals, from which again pure cultures of the same bacteria were obtained; but biologists do not agree upon this point. Notably, Miller has been unable to get the same result with his experiments, and who questions the correctness of others' claims in this direction? Therefore, in view of its doubtful origin, we can only be safe in recommending as a precautionary measure general treatment for any constitutional defect that may be present, and then apply ourselves to the local sources of irritation.

Many instruments have been devised for the purpose of removing the local calcic deposits, but none that I have used have given me such thorough satisfaction as small excavators ground flat. They can be

prepared in a moment with a corundum-disk in the engine, so that we have always at hand a scaler so small that it can be passed along the side of the root to the very end of the pocket with the least possible pain and laceration of the gum, besides being so sharp that the slightest sensation of roughness would be recognized by the fingers of the operator in a manner that would not be possible with a less delicate instrument.

In the application of local remedies, three properties are necessary, —antiseptic, acid, and astringent. Antiseptic, because bacteria are always present, and to dissolve the particles of lime-salts that always escape the mechanical cleansing; astringent, to reduce the inflammation and constrict the relaxed gum-tissues. Hydrogen peroxid is a valuable wash for the purpose of syringing out the pockets; it destroys the pus, and at the same time acts upon the limy deposits in a most cleansing manner, by reason, no doubt, of the hydrochloric acid which the preparations on the market have been found to contain. Dilute sulfuric acid, the aromatic preparation of sulfuric acid, the essential oils, and other remedies of a like nature are recommended. Pyrozone is also very highly spoken of.

During the last four years since my residence in Duluth, this trouble has come under my care for treatment a great deal, either because it is of a catarrhal nature, and the situation at the head of Lake Superior is particularly favorable to its development, as to all catarrhal affections, or because, having been constantly looking for it, more cases have come to my notice; but whatever the reason, it has appeared in every stage of development, apparently in much larger proportion than in my practice in other localities. The conclusions which I have to offer are therefore of an entirely practical nature.

First, in regard to its so-called incurability, by reason of its relation to so-called constitutional causes.

My most obstinate cases have been almost invariably persons of robust stature, in whom apparently all of the predisposing constitutional affections were wanting, whose teeth gave little trouble from caries, every indication pointing to good structural development and a healthful general condition.

A typical illustration of this class is a patient who came under my care in January, 1889, age forty-four years, temperament a combination of bilious and sanguine, well-developed chest, good circulation, good digestion, regular habits, a vigorous, active business man, never had been seriously ill in his life, no catarrh of nose or throat, no rheumatic tendency, no skin-disease, nor did a history of his case develop that any of his family had ever been, to his knowledge, affected by rheumatism, syphilis, scrofula, rachitis, or tuberculosis, and a most thorough examination of his urine failed to show any abnormal condition pointing to Bright's disease or anything of that nature. Examination of the arch gave but little better promise; the teeth were large, with perfectly developed crowns, each as nearly in its proper position as possible; the occlusion of the jaws correct, except where the affected ones had elongated as a result of the disease, not a carious tooth among the number, all in place except the left superior third molar that had fallen a first victim to the disease. There was some accumulation of tartar, and its usual accompaniment of other deposits; the buccal roots of the right superior second molar

were denuded their entire length as shown in Fig. 1. A loose flap of gum remained upon the buccal side of the first molar, but examination showed that the pus-filled pockets extended almost to the end of the root. The gum about the necks of the other teeth showed more or less pus upon pressure.

Treatment was continued at regular intervals for a period of two years, an antiseptic mouth-wash prescribed and used regularly one or more times each day; the pulp-canals of the two molars were cleaned and filled, for the continued formation of pus had finally reached the ends of the roots and destroyed the connection there; the pockets and necks of the teeth syringed with antiseptics, the loose gum removed by use of the lancet and by absorption, until both molars had buccal roots denuded.

The first sign of improvement was a cessation of the discharge from about the necks of all the other teeth, and finally it was checked about the molars; and all around the edge of the gum, at the line next to the affected molar roots, there appeared what seemed to be a line of brighter-colored new granulations.

I still see the patient every five or six months, and he continues the use of the wash, but apparently there is no return of the pyorrhea.

We have seen that all ordinary methods of discovering constitutional predisposition failed, and the fact that the case yielded finally to local treatment would seem to indicate that the cause was a local one. We know that the contagion theory is not borne out by the transmission by contact from one person to another, for if it were, undoubtedly husbands and wives would both be affected commonly, instead of very seldom, as reported. And yet, notwithstanding all this, I have under my care the two daughters of this patient, aged respectively twelve and fourteen years; they have each had severe inflammation of the gums, and quite recently I cleansed a pus-filled pocket at the neck and palatal root of a first molar in the mouth of the younger one.

Pyorrhea can undoubtedly be held in check, and with continued proper care be prevented from reappearing; but whether or no it can be entirely cured, as is claimed by many, is a question not easily answered, because, once severely attacked, even though the discharge be stopped, the parts never again regain that normal condition which should make them invulnerable to their destructive surroundings, and it is certainly a questionable difference whether a recurrence of the trouble be from the original infection or a fresh one. Therefore, I hold that just so far as a condition of self-cleansing surfaces can be restored, in that proportion only can the cure be estimated. To this end, therefore, I recommend (notwithstanding instruction from high sources to save the gum-margins) the removal of loose flaps of gum covering the pockets (Fig. 2), for I do not believe that they can ever be made to attach themselves to the separated surfaces again, and must of necessity afford a lodgment for infectious influences.

The loose teeth should be banded to firm ones, and the irritation of their movement in the sockets thus removed, also the occluding surfaces ground down until the excessive strain due to elongation be obviated.

The one final injunction before passing the subject is to urge the

importance of going to meet this trouble, not waiting until the pus-filled pockets are thrust upon us. Part of my regular examination is a pressure of my finger upon the gums inside and out all around the mouth, and it has been a matter of surprise to me to find how many of the apparently unaffected cases showed that light-colored exudation ; not pus, but its almost certain forerunner.

This is the stage at which pyorrhea may certainly be cured, and to use a Hibernian mode of expression, the best time to cure it is before it has begun.

In taking up the subject of infections from gangrenous tooth-pulps and alveolar abscess, one is confronted by a most appalling array of dangerous possibilities. However, as the subject of this paper was suggested to my mind by a point raised in conversation with a prominent physician, I will quote his remark and discuss from that standpoint. He said, "I believe in saving teeth, and all that sort of thing, but it seems to me that dentists are too anxious to save teeth, and put on crowns to preserve roots that afterward cause serious trouble and are an injury instead of a benefit to health."

The undeniable force of this statement as generally applied struck

FIG. 1.

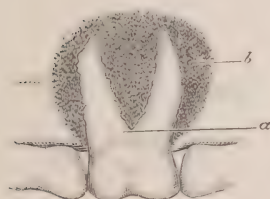


FIG. 2.

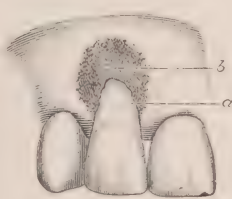


FIG. 3.



me, and a perusal of medical literature showed, in almost every instance, wherever the general practitioner entered upon a discussion of diseases associated with the teeth the same idea governed his reference to the treatment of the mouth.

Miller speaks quite bitterly of the custom of many physicians of disregarding dental diseases altogether as a factor in pathology, and says it is "as unjust to their patients as it is discreditable to their profession," but I do not agree with his censure of the physician ; the fault lies among dentists, and there is where it would please me to apply the spur.

A gangrenous tooth-pulp may be removed, the root-canals disinfected by thorough drying with hot air or a heated wire, and the use of antiseptics, preferably one that is not a coagulant (I use oil of cassia), and the danger of further infection removed ; but when an apical abscess has formed, such as is shown in Fig. 3, the destruction of the pus-sac, and the removal of the surrounding alveolar process as well, becomes necessary. An incision through the gum, followed by free use of a bur in the dental engine, quite readily effects the removal of the diseased tissues ; then, by enlarging the opening through the end of the root from the inside, medicaments injected into the opening in the crown can be freely forced through the end of the roots, and forced out through the gum, thus washing the entire affected surface perfectly clean. A tooth thus treated is almost as com-

pletely under control as if it were extracted and in the hands of the operator, so far as cleaning it is concerned, and if the roots be immediately filled the wounded surface will heal up as readily as a simple cut. Even the most chronic cases that have resisted other methods for years will yield to this treatment, provided, however, there be enough of the periosteum alive; but of course the destructive processes sometimes include the entire surface of the periosteum, and the root being entirely dead, nature will not tolerate it, and her efforts to get rid of its annoyance will be continued.

A few fragments of necrosed bone are all that was left of that portion of the superior maxilla on the right side, extending from the central incisor to the tubercle, including the floor and part of the outer wall of the antrum, as well as part of the palatal process, from the mouth of a young woman who suffered some three weeks before I saw her.

Removal of the necrosed bone and the teeth in that region with it, the application of the engine and a large bur over all the roughened edges, washing with peroxid of hydrogen, oil of cassia, and equal parts of peroxid and bichlorid of mercury one one-thousandth, gave almost immediate relief. A tonic was prescribed (for a slight formation of pus upon one of her thumbs gave reason to fear, as did also her color, that there was danger of pyemia), and also an antiseptic mouth-wash, with instructions to use the latter freely. A rapid healing of the parts followed.

For three months a poor unfortunate was kept in one of our hospitals with a fracture of the lower maxilla that refused to unite. When he came to me there were three fistulous openings in his neck just below the angle of the jaw, into which the Sisters of Charity packed cotton in masses as large around as my fingers.

The fracture had occurred by reason of a blow from some heavy instrument, and search proved that at the same time the pulp of a lower molar had been destroyed. After its removal, together with a portion of necrosed bone, with syringing, as in the last case, in a few days the patient was discharged as cured.

Of very common occurrence is the infection of the maxillary sinus from apical abscess.

Many cases of so-called catarrh of the nose, throat, and ear-passages have had their origin from this cause, and have been cured by treatment from the mouth in the following manner,—viz, removal of the source of infection by extraction or treatment of the tooth, and a free opening made through the floor or outer wall of the sinus as low down as possible, to give better drainage and to allow therapeutic cleansing by forcing medicaments out through the communicating opening into the nose, and with the head thrown back let them run down the throat until they thus reach almost every portion of the exposed surface of the mucous membrane.

I believe it will soon be considered the correct method to open into and treat through the sinus every case of chronic catarrh of the nose.

The same lining membrane must and does transmit the infection to the antrum. The offensive secretions thus formed are held as in a pocket, where the usual treatment through the nasal passages cannot reach them. What more natural, then, than the treatment described?

No need to cite from practice cases of diseased antrum ; we have all had too many of them ; but I have given great relief in a number of instances where no purulent suppurative condition of the antrum was present simply by the direct effect upon nasal catarrh that seemed to be otherwise incurable. One of my patients recently came to me in an extreme state of exhaustion. The constant presence in his throat and stomach of the discharges from his nose had prevented his eating or sleeping for some days and nights. Relief was immediate.

I use peroxid of hydrogen until the passage into the nose is opened up, and after it a strong solution of salt and water is quite sufficient and very safe. Thorough drainage, however, is the most important step. Syphilitic necrosis, and lesions of the soft parts of the mouth, require, in addition to the surgical and antiseptic local treatment, the internal administration of potassium iodid and mercuric chlorid, for which, together with a proper general treatment, I always recommend them to the physician, knowing full well that we can each of us do better with the assistance of the other.

The presence of bacteria in such great variety and number in the mouth at all times must be looked upon as a menace not only to the teeth in their relation to dental caries, but through their action as well upon the mucous membrane in rendering it more susceptible to the germs of specific diseases, fevers, etc., upon the digestive tract, for many complaints of the stomach and intestines have been found to be caused by mouth-bacteria and their waste products. Even the lungs are subject to this influence from the mouth ; therefore its thorough disinfection becomes a matter of first importance. Recognizing this fact, Miller, Black, and others have most carefully prepared comparative statements of the strength of the various antiseptics used.

Miller particularly has demonstrated that the rapid use of the ordinary antiseptic wash, unless accompanied by thorough cleansing, is of comparatively little benefit, because at least several minutes are necessary to sterilize particles of food lodged between the teeth. He recommends the following formula as one having most rapid action :

R—Acid. thymic., .25 gram ;
Acid. benzoic., 3 grams ;
Hydrargyrum bichlorid, .80 gram ;
Tinct. eucalyptus, 15 grams ;
Alcohol. absolut., 100 grams ;
Ol. gaultheriæ, gtt. xxv.—M.

Black's one, two, three mixture is—

R—Carbolic acid, i ;
Oil cassia, ii ;
Oil wintergreen, iii.

The wash that I have for some time past given to my patients is—

R—Listerin ;
Glycerol ;
Carbolic acid.—M.

Sig.—Dilute one-half teaspoonful in one-third glass of water ; brush on teeth and gums ; hold in mouth, and use on silk between the teeth at night.

I give instructions to use full strength on the silk, in cleansing the mouth to hold it, and continue its use for several minutes consecutively.

This wash and the manner of using it has given my patients great satisfaction, not only as a means of checking tendency to caries, but also in fevers, such as typhoid, by relieving the unpleasant accumulations of mucus, and I believe has exerted an influence toward obviating the deteriorated condition of the teeth which almost invariably follows this class of diseases.

A physician who had noted its effect upon one of his patients got the prescription from me, and now uses it regularly in his practice.

The day is fast approaching when the treatment of the oral cavity will be a battle with therapeutic remedies, rather than one of mere mechanical skill, and if I have seemed to give undue emphasis or wearied you with too careful note of little things, let me excuse myself with the honest statement that nothing in my professional experience has given me so much encouragement,—so lifted me above the daily grind of bread-winning, or made me feel the great possibilities that are before us so keenly as the bringing to light of some hidden source of trouble that perhaps for years had caused pain and distress, and being the instrument for its relief; and this can only be accomplished by looking for the little signs that have escaped notice by reason of their deceiving insignificance.

Discussion.

Dr. Edgar Palmer spoke of a new tooth-powder recommended to him by a physician for morbid conditions of the mouth, such as spongy conditions of the gums and fungous growths. The powder was quinin, and Dr. Palmer asked those present if they thought there was anything in it.

Dr. Talbot said there were three distinct conditions which were called pyorrhea alveolaris, and properly so called, too, as each was shown by the flow of pus from the alveolus. The first was Riggs's disease, which results from deposition of tartar upon the teeth below the margins of the gums; the second is the condition described by Dr. Ingersoll, characterized by the deposit of sanguinary or serumal tartar; and the third, of which variety he has cases at present, is a disease of the gums only, with no particle of deposit. He wished to bring out the necessity for systemic treatment for these cases. Unless the systemic condition is good, the disease will not be cured; and if the general condition after the cure of the local disease is attacked by gouty, rheumatic, or renal trouble, the condition of the teeth will return.

We as dentists do not pay the attention to the mouths of our patients which we should. It should be the rule to always examine thoroughly every mouth in which we have anything to do, and treat and clean it, putting it in a thoroughly healthy condition. This is a very important part of our work, and we should be paid for it, otherwise we cannot afford to do it. When a patient comes to him where pockets are observed along the margin of the gums, he removes the tartar from the teeth and saturates the gums with clear tincture of iodine. After the second day he thoroughly overhauls the mouth, and proceeds with the treatment as recommended by the essayist. If,

however, the teeth are loose, he cannot treat successfully, except by removing them. With the teeth extracted, it is a simple matter to heal up the gums and keep them in a healthy condition.

Dr. A. M. Benson asked how the iodine healed the gum.

Dr. Talbot said he did not know how, but knew that it did. He said that it was generally known that iodine would reduce tumors and swellings in all tissues, but we do not know how it acts.

Dr. Benson thought that if the teeth and gums were freed from all foreign substances, the healing would come without medication.

Dr. Talbot said that in cases where there was no tartar on the teeth it was often possible to cure by systemic treatment, and spoke of cases in his own practice which he had successfully treated by building up the system, omitting all local treatment.

Dr. W. A. Gudex said that Riggs's disease was perhaps the most puzzling and least promising of the troubles which dentists were called upon to treat. It might be described as an ulcerative pericementitis,—sometimes the result of mechanical irritation, sometimes, he thought, the result of lead-poisoning. He had noticed it in painters who had suffered from lead-poisoning. He could not boast of much success in treating it. The only radical treatment was to remove the tooth or teeth affected.

Dr. J. Taft said that the treatment of diseased gums was very difficult, but he thought the treatment pointed out in the paper was suitable for a majority of cases. In many cases the general system is in such a state that it is impossible to cure the local disease without systemic treatment; the system must be toned up. In other cases the general condition is so hopelessly poor and defective that it cannot be brought up to a state in which there would be hope of success. In such cases the only thing to do is to extract.

Then there are cases where the general system is so good, is so well nourished, and has such recuperative powers, that if the irritant be removed the part will cure itself. Remove all necrotic tissues, either by an instrument or by an escharotic, or by some other remedy, such as iodine or peptin; these seem to break down the necrotic substance and to stimulate the circulation, which carries off the broken-down, useless tissue. It is necessary to remove everything which will be an injury or an irritant. Simply pressing the finger on the part several times a day will be beneficial, as the pressure drives the blood away, and upon relieving the pressure there is an influx of new blood and an increased circulation which will help to carry off the diseased matter.

Robinson's remedy acts well as an escharotic, and if used as directed will prove efficacious in a large majority of cases. A dentist should always know just what effect he should expect from every remedy he uses, and why he uses the particular substance to effect the purpose.

Dr. Vida A. Latham spoke of the structure of the peridental membrane, and said that it had never been properly described. She denied that there was such a membrane, stating that it is the same as the periosteum, and that there was no reason, just because it ran over the root of the tooth, that its name should be changed. The text-book descriptions of this membrane vary, some saying that it is an elastic membrane, and others describing it as a ligament; she thought it showed careless writing in the books that they varied so.

She thought a good name for pyorrhea alveolaris would be osteoperiostitis, meaning an inflammation of the bone and the tissues surrounding the bone. These affections do not differ from similar inflammations in other parts of the body. Wherever found, they are very hard to treat, as they usually occur in persons of poor organization, whose vital force is low and recuperative force almost nothing. In such cases the very structure of the bone is poor.

Dr. G. V. I. Brown said that his purpose in describing the case in his paper was to bring out discussion, as the patient was in perfect physical health, and he also wished to call the attention of the members of the section to the fact that the daughter of the patient was troubled with the same disease, showing, or appearing to show, that heredity was a factor in some cases.

On motion, the discussion was closed.

The Committee on Nominations reported the following candidates, who were unanimously elected: Chairman of the section, M. H. Fletcher; secretary, E. S. Talbot.

Adjourned to meet at 3 P.M., Thursday, June 8.

THURSDAY, JUNE 8.

The section met at 3 P.M., Dr. A. E. Baldwin in the chair.

Dr. Vida A. Latham read a paper, of which an abstract follows, entitled—

DISEASES OF THE MAXILLARY BONES AND THEIR PERIOSTEUM.

Under this heading we will notice some points of interest connected with dental surgery and pathology, although the causes and history of these diseases are so numerous that it will be almost impossible to do more than briefly allude to some of the most common forms met with by dental surgeons, every one of whom ought to have such a knowledge of the affections of the oral cavity that he might, with some degree of certainty, determine what the causes are, their pathology, diagnosis, and their treatment. Especially should we know the morbid growths which can occur, whether benign or malignant, so that we may early diagnose the case, and if we do not care to take such cases for treatment, to warn our patient to consult a surgeon.

Many of these affections we as dentists are called upon to treat, and others, after they are diagnosed, we should hand over to the care of the physician. With these cases, whether simple or serious, we should be well acquainted, as we are more likely to see them in their early stages, and by immediate interference we may warn our patient, and thus induce him to obtain medical or surgical attention, and thereby save him from long and serious—yes, and often fatal—illness.

We are all aware of the difficulty in diagnosing oral tumors. For example, in epithelioma it is far better to urge early surgical interference than to wait until extension by the lymphatics places the patient beyond help. Hence make an early diagnosis, examine every sore, ulcer, and spot in the mouth, using every precaution in anti-sepsis for the benefit of the patient and yourself.

For the reason that the diseases of the jaws are not often discussed, I have ventured to write a few notes on them, to try to show that

they bear the same relation to dentistry as do the diseases of the gums. It is a matter of some difficulty to decide how to classify the subject. Perhaps the easiest way will be to discuss first the periosteum and its diseases, and then the close relation it bears to the bone itself will explain how the latter becomes affected.

The alveolo-dental membrane intervenes between the tooth and the bony socket or alveolus. It was formerly supposed to consist of two layers, but the idea has been abandoned since it has been demonstrated that fibers could be traced continuously from the bone to the cementum. The membrane, periosteum, or ligament, as it is variously called, consists of connective tissue, between the bundles of which run groups of vessels and nerves; but it contains only a few yellow elastic fibers, and therefore cannot be stretched much. It is, however, necessary that the tooth should be capable of some degree of movement in its alveolus, for every temporary inflammation, by increasing, for the time being, the blood-supply of the part, causes the partial extrusion of the tooth, which is so well known to patients as being "longer than the rest." How, then, if we have so few elastic fibers, is there movement of the tooth, without tearing the unyielding membrane, rendered possible unless it be by a special disposition of the fibers? The bony attachment of each band of fibers is nearer the neck than the cemental portion of the tooth, and may be looked upon as suspending the tooth in the alveolus by fasciculi of the periosteum rather than as resting upon the membrane, and therefore some play is allowed, as the tooth can be raised or lowered until the cemental fibers are visible or lost to view. The fibers are continuous, but there is a slight difference between the portion nearest the bone and that nearest the cementum. At the former place the fibers are larger, while at the latter they become a fine net-work and more cellular. Again, age affects the tissue, for specimens show it to be thinner, more especially the cemental portion; but it is not entirely obliterated. The periosteal blood-supply is very complex, being derived from the pulp-artery,* branching off just before it enters the foramen, and the terminal filaments anastomosing with the arteries that supply the gums. Just at the rim of the alveolus there is a rich plexus formed by union with the arteries of the periosteum and gums, the "gingival plexus," and near the cement there is a capillary plexus. "The blood-vessels are most numerous midway between the bone and cementum, or rather nearer the latter" (Tomes). Thus we may conclude that the teeth have three sources of nourishment,—viz, through the pulp, and through the peridental membrane in its two sources.

The exact nature of the membrane is still far from satisfactorily explained. Malassez (*J. B. Assoc.*, 1885, p. 484) says it is a ligament, for these reasons:

(a) If true periosteum existed in such a situation, mastication would be a very painful process, owing to the abundance of nerves.

(b) Microscopically the tissue is more ligamentous than periosteal in structure.

(c) Mastication produces traction, not pressure.

(d) The attachment to the bone and cementum is precisely like a tendinous insertion.

* "The Blood-Supply of Teeth." Dr. Hunt, in *Dental Review*.

(c) The distribution of the vessels and nerves in the interstices between bundles of fibers suggests ligament and not periosteum.

Ranvier and Kölliker take a similar stand regarding its structure. And yet we know it is true that the membrane is directly continuous with the periosteum covering the rest of the maxilla; that the shock of mastication can be borne on periosteum, as, for instance, in edentulous ridges of the jaw-bone; and again, it is certainly not quite a typical ligament, but a typical periosteum with a specially modified function.

The alveolar walls develop at the same time as the root. Proceeding from the base of the follicle is a line of cells, the formative point of cementum, and another line, the formative organ of the alveolar walls; one develops down to form the socket, the other forms the cementum, the two layers being continuous. Whether the membrane is single or double is a question. Analogy from anatomy, etc., would make us think the true membrane would be in two layers. Demonstration proves it, for on extraction the root of a tooth is covered by a membrane and the alveolus is lined with a membrane. The alveolar lining is from the bone, and so it must be referred to the osseous system. The formative organ of the cement, can it be the same as that which forms the alveolar walls? Some say it cannot, and yet the cementum is like true bone, except for the perfection of the Haversian canals, and the lacunæ are irregular in shape, size, and distribution; the canaliculi are more numerous from the periosteal side of the lacunæ, fewer run inward toward the dentinal surface, and they contain the remains of the formative "osteoblasts" as we find in bone. The cementum contains "fibers of Sharpey" developed from the formative periosteum, which are calcified bundles of fibrous tissue like those in bone, and therefore why can we not call the cementum a modified bone? Tomes says the cemental organ and that which forms the alveolar walls are not the same; they are closely united but distinct and separable, the external formed from connective tissue with blood-vessels, the inner a layer of cells. Dr. Ingersoll says he saw some of Dr. Black's specimens, and one was perfect in showing the histological difference of the two layers. None of the straight lines of the peridental membrane were found in the alveolar membrane. If the membrane is double, two sources of vascular and mineral supply would be expected, from the pulp and from the sub-mucous tissues. Pathology aids us by revealing the difference in exostosis and hypercementosis. Irritation follows the blood-vessels, and under the influence of irritants the root may take on an abnormal action; this is one form of exostosis, which latter term should be properly named either ex- or hypercementosis. If the nerves and blood-vessels follow the course of the membrane and it is not double, why are not both layers affected? Why do we not have both true exostosis or enlargement of the socket and also hypercementosis or enlargement of the roots, consequently tooth-ankylosis? When two roots are exostosed they grow together by impingement, but never the alveolus and root, hence there is no osseous union. Yet, again, how often do we find periodontitis go on to periostitis, one being usually primary to the other? Would this not imply they were connected, if inflammation can so readily pass on from one to another?

1. The periosteum and the peridental membrane are identical. I prefer the term periosteum.

2. It is divided into two layers, internal and external, or osteogenetic and fibrous; the internal or osteogenetic forms the alveolar layer, and the external or fibrous forms the cemental layer.

3. The alveolar and cemental membranes are not identical.

4. The two layers have different functions, one forming and lining the alveolus, the other surrounding and holding the root.

5. The cement appears to be developed from the periosteum and not from dentine or odontoblast cells, as under the microscope it has the same appearance as bone, except that the lacunæ and canaliculi are not so perfectly developed.

6. When cementum is required to be very thick, as in herbivorous animals, where it is destined to cover the whole tooth, Magitot says it first becomes the seat of a formation of hyaline cartilage, which ossifies like any other bone developed after the intra-cartilaginous method. Where it is to be thin and only cover the crown, as Nasmyth's membrane, it is the seat of ordinary intra-membranous ossification.

7. Pathology shows the same fact; there is no cemented union between the root and the alveolus.

8. The rapid mineral absorption of the root without exfoliation is due to the special nature of the dental membrane as distinct from the membrane of the socket, and has been microscopically proved.

9. It is a great deal better to consider the peridental membrane as periosteum divided into two layers:

Periosteum	{	External (fibrous) layer, continued as the cemental layer. Internal (osteogenetic) layer, continued as the alveolar layer.	}	peridental membrane.
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The structure: white fibrous tissue, cells, blood-vessels, nerves, little elastic tissue, and no fat. Thicker at the neck than at the root.

Fibers of periosteum run downward and inward to the root, so the more pressure on the tooth the more tense the fibers. Structurally there is one common periosteum for tooth and alveolus, the fibers at the cemental surface being looser than near the bone. The fibers attached to the bone are arranged into bundles, thus some parts are seen to be denser than others. In the reticular or cemental fibers, cells or osteoblasts are seen, and also at the bone surface. Corpuscles are also dotted all throughout the periosteum. The fibers of the periosteum at the neck blend with the fibrous tissue of the gum and with the periosteum of the alveolar border.

Pulpitis leads to periodontitis or periostitis by free communication from vessels of the gum.

Diseases of the Alveolar Dental Periosteum.—The principal one is inflammation (periodontitis), and its causes number at least seventeen, viz:

Want of occlusion, malocclusion, tartar, looseness of teeth, induration of tooth-tissue, cavities of decay impinging on cementum, excess of filling-material, pulpitis, extraction of pulp without hemorrhage, external irritation by forcible removal of pulp, enlarged foramen, putrescent pulp, previous periodontitis, action of medicines locally, contact with arsenic, morphine, action of medicines systemically, action of syphilis, fever, diphtheria, gout, rheumatism.

Inflammation here is no different pathologically from any other, but it has special symptoms because of its position.

Rheumatic periostitis is acutely painful, does not lead to suppuration, and varies with the weather.

In mercurial periodontitis the breath is very foul, and if mercury is continued the whole surface sloughs away, together with much of the alveoli.

Strumous periodontitis tends to rapid suppuration, swelling and abscess, and is less painful.

Periodontitis due to phosphorus fumes is apt to end in necrosis of the entire jaw-bone.

The varieties of periodontitis are :

1. Acute, sub-acute, and chronic.
2. Traumatic.
3. Absorption of roots, in diseased condition of the membrane and after injuries, transplantations, replantations, etc. When the membrane is healthy, no absorption of roots of permanent teeth takes place.
4. Apical. Confined to usual space, following death of pulp.
5. Gingivitis. Inflammation of peridental membrane at border from constitutional causes, as ptyalism.
6. Calcic inflammation.
7. Phagedenic. A specific, infectious inflammation having its beginning in the gingival border and accompanied by destruction of the periodontium and alveolar walls. Riggs's disease.

Periodontitis may be local or general, the majority of cases being the latter.

Repair of the peridental membrane is said never to take place by first intention, but always by granulation, which may begin in the tissue overlying the parts of the root ; but the reattachment creeps in from the injury where the peridental membrane is intact, or from the extremity of the pocket above, and slowly covers over the denuded portions of the root of a tooth. Sponge-grafting has been suggested to renew the gingival and lower border of the peridental membrane when lost from phagedenic periodontitis.

Periostitis, both acute and chronic, affects the jaws. The acute form is a dangerous one, as it so often runs into suppuration with consequent necrosis. It is only in the early stage that it can be recognized. The more chronic form is commonly connected with syphilis, and leads to the formation of nodes about the palate and enlargement of portions of the inferior maxilla, and it may be well to mention that many cases of persistent facial neuralgia which are unrelieved by quinin, etc., yield to potassium iodid, and may be said to depend upon chronic periostitis or osteitis, with probably pressure on the dental nerves.

Necrosis. This disease affects the inferior much more commonly than the superior maxilla, probably in consequence of its being less vascular (Heath). Beginning as periostitis from dental irritation, injury, or action of specific poisons, the symptoms generally are : Pain with pyrexia ; part swollen, injected, teeth raised and unable to bear any pressure. If immediately relieved by leeches, free incision, hot poultices, etc., the symptoms may subside and no further injury result ; but usually pus is to be found beneath the periosteum before

the patient comes to you, and even then, though evacuated instantly, necrosis is usually the result. Luckily, necrosis sometimes only affects the external plate of the alveolus, so you get the teeth supported by the internal plate and you can keep them *in situ*; but when the entire alveolus is involved, the teeth loosened and possibly useless, they had better be removed, as they only stop up the discharge. Do not attempt to remove sequestra unless you are sure they are completely loosened, or you may inflict injury on the surrounding parts and interfere with the process of repair, and this is especially the case with children in whom the second teeth are still undeveloped. The time of separation is difficult to decide on, for we must depend on the strength of the patient and the extent and position of sequestrum. It takes usually about six weeks to three months before large sequestra can be safely removed.

Another form of necrosis is the exanthematous, so named by Salter. This name is applied to the diseases found in young children, usually after attacks of specific fevers, especially scarlet fever and smallpox. Necrosis of portions of the alveolus of either maxilla, which usually occurs on both sides alike, or even when it involves the whole thickness of the lower jaw, is now taken as one of the sequelæ of these diseases, and possibly many cases in years gone by thought to be due to calomel were solely due to the action of the specific poison.

The repair of bone in necrosis of the upper jaw is a little different from that of the lower. No reproduction of bone takes place, the gap left in adults being permanent, though in children, the subjects of exanthematous necrosis, the granulation-tissue is slowly converted into fibrous tissue, which does not as a rule ossify. In the inferior maxilla, abundant new bone is formed by the periosteum, and for a time, at least, most extensive losses are repaired. It is certain, however, that in the course of years a great, if not a complete, resorption of new bone thus formed takes place, the patient being left finally with very little if any support for artificial teeth. Professor Salter has suggested that the early application of artificial teeth would tend, by use, to strengthen and maintain the permanence of the new bone: but I believe there are no facts to support this view.

The action of the fumes of phosphorus is well known to cause necrosis, but is less common now than formerly, on account of the substitution of red amorphous phosphorus for the yellow variety. It only occurs when the teeth are carious and the jaws in an unhealthy state. Those with carious teeth who work with phosphorus are always affected, and the necrosis is violent and rapid. The disease may begin as osteo-periostitis which rapidly ends in necrosis, or it may begin by osteo-plastic inflammation, swelling, profuse and offensive suppuration of the soft parts, attended with pyrexia. These symptoms are sometimes followed by gangrene, erysipelas, and death. Sometimes the removal of the sequestrum is followed by recovery. The whole jaw is usually involved, the callus lying between the sequestra. The notable point to be observed in phosphorus necrosis is the peculiar deposit of pumice-like bone, which takes place upon the sequestra. This no doubt comes from the periosteum, although so closely adjoining the sequestrum as to be almost always brought away with it; and though resembling true bone in some particulars, it is a little lower developed form of bone. A deposit closely allied to this,

however, has been noticed in cases in which there was no phosphorus involved, and it would appear that, in some instances, possibly of rheumatic origin, the deposit of new bone partakes of this character.

The action of mercury can be briefly mentioned here. It injures the teeth in two ways: by salivation, and by the graver injury, the production of honeycombed teeth, which is often confused with the effects of inherited syphilis. Honeycombed teeth are the result of mercurial treatment during the period when the enamel is being calcified (J. Hutchinson, Path. Soc. Trans., vol. xxvi, 1875, p. 235 *et seq.*). The two affections have been discussed by Mr. Hutchinson together, and because they are coincident with ophthalmic changes, and the question of mercury occurs in both, much confusion has arisen. Below are briefly contrasted and tabulated these conditions:

Honeycombed.

Syphilitic.

- | | |
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| 1. Are peculiar only in the latest formed tissue, the last layer of enamel. | Are most peculiar in the earliest formed tissue, the last formed enamel being usually perfect. |
| 2. Perfect at birth, become affected after a year or so. | Are imperfect from earliest germ stage. |
| 3. Are coincident with lamellar cataract, infantile fits, and mercurial treatment. | Are coincident with interstitial keratitis, inherited syphilis, and have nothing to do with mercurial treatment. |
| 4. The teeth that suffer most are the first permanent molars. | The teeth that suffer most are upper incisors. |
| 5. The general form of the teeth is unaltered. | The form of the teeth is profoundly modified. |

Mercury, as a rule, is a lasting injury to the deciduous teeth, but its effect on the periosteum in adult life is transient, unless long continued. In mild cases, in addition to periostitis, there is a profuse flow of saliva, a mercurial fetor of the breath, with later on swelling and sloughing of the alveolus and gums, upon which in severe cases a whitish membrane appears; this is at first lightly attached, but later is adherent, and it is *underneath this* that ulceration of the gums takes place. The teeth soon loosen and are lost, and in very bad and neglected cases the whole surface sloughs away, together with much of the alveoli, and necrosis of the whole jaw may result, and we have mercurial stomatitis.

Periostitis due to rheumatism will very likely pass away, especially if much affected by the weather, but it is often difficult to persuade a patient to retain a dead tooth which keeps up this periodical irritation. For these cases, what treatment can be given other than systemic remedies, counter-irritation, warmth, and patience?

Periostitis due to syphilis or struma is not so easily disposed of, for it usually progresses to the worst degree.

Salivary calculus if removed in time will scarcely ever cause dangerous periostitis, but the serumal is a great deal more likely to set up and prolong irritation to such a degree as to cause exostosis and its concomitants; and as we can seldom remove it unless by extracting the tooth and scraping the deposit from the ends of the roots and replantation, the prognosis is not at all favorable.

When due to the last stages of pulpitis, misapplication of arsenic, the chances of recovery for the tooth are smaller.

Before noting the diseases of the maxillæ, it will be well to allude briefly to a disease of the alveoli, pyorrhea alveolaris or Riggs's disease. We are all very well aware of how little is known on this subject, and of the theories advanced. Why should we classify this as a special disease all by itself, instead of following a more logical course and regarding it as a pure periosteal one, for its pathology can be best understood if it is regarded as a form of osteo-periostitis, even though it is confined to the alveolus and bone,—in fact, a final stage of periostitis, as the effect upon the teeth is entirely secondary and consequent upon their separation from the soft parts. In its symptoms and characters, both macroscopically and microscopically, the course it follows, and its amenability to various forms of treatment, it presents no special phenomena to distinguish it from simple caries of bone, save that the latter disease is almost always associated with an impaired condition of the general health. In this respect and in the absence of fever, pyorrhea alveolaris more closely resembles Sir James Paget's osteitis deformans, concerning which I quote the following: "The surrounding gum becomes spongy, deep red, and sometimes tender; it separates from the neck of the tooth, while at the same time the periosteum suppurates and discharges pus, which is continually oozing out around the necks of the teeth and can be generally pressed out in great quantities. It is extremely chronic, begins generally in early middle age, and may continue for an indefinite time without influencing the general health. The early stages of the disease are sometimes attended with pain, varying widely in severity. The breath is usually foul, the roots covered with irregular granular masses of greenish or blackish tartar, and the discharge offensive and the whole mouth tender."

The causes are not easy to find in all cases, but they are similar to those which cause periostitis,—injury of any sort to the periosteum, as cold, a blow, or excessive bite. A strumous or syphilitic diathesis often co-exists.

The treatment should be based on surgical and medical principles, allowing for location, exactly like caries of bone, where the use of steel instruments is usually contraindicated on account of the further injury which is likely to ensue. Unfortunately, our knowledge has been handicapped thus far by regarding this disease as a purely dental one confined to dental tissues, instead of a surgical bone-disease. The more the disease was regarded as dental, the more did we forget that the alveolus was only ordinary bone, subject to the same changes as any other bone, and having just as unsatisfactory treatment as caries has wherever it occurs.

Necrosis contrasted with caries:

Necrosis.

1. Parts affected in compact tissue. Blood-vessels are better supported in compact bone and so less liable to passive congestion, but from the narrowness of the canals they are quickly strangulated by the pressure of the exudation, and so the bone is rapidly and completely deprived of vitality.

Caries.

1. Most common in cancellous tissue. Here is room for dilatation and exudation without their causing a sudden stasis in the vessels.

Necrosis.

2. Result of probing. A probe is suddenly arrested by striking against hard bone, without giving rise to pain.

3. Nature of the discharge is mostly purulent.

4. Granulations along the sinus and at its orifice are comparatively healthy, often fungous and florid.

5. Cause. The more acute, local injury or constitutional, as acute specific fever, more likely is inflammation to end in necrosis.

6. In syphilis both are frequent.

Caries.

2. It is felt to pass through soft inflamed bone, and this is quite sensitive.

3. More watery or serous, and has a greater amount of lactic acid.

4. Small or large, pale and oedematous.

5. In scrofula, caries is most common.

Under the head of hyperostosis we will group cases in which general enlargement of the maxillary bones occurs, without any tumor which could be properly placed among the osteomata. Enlargements of the angles of the inferior maxilla quite apart from the development of the teeth, and giving a peculiarly broad appearance to the face, occur in otherwise healthy subjects of about twenty, and they appear to be stationary. In true hyperostosis, however, there are always large nodules of bone, often symmetrical, thrown out by the bones of the face and cranium, which slowly but steadily increase in size, producing hideous deformity and finally causing death. Heath has operated on some cases where the disease was unilateral, with good success.

Cysts occur in both jaws, either single or multiple. Their origin is probably in the cancelli of the bone, and is in many cases due to irritation caused by neighboring teeth; a cancellus being filled with fluid expands, and produces a gradual absorption and obliteration of neighboring cancelli until a cyst of considerable size is formed.

The multilocular cysts of the inferior maxilla appear to be more closely connected with the teeth than the single cysts, since in many cases the extraction of teeth or stumps gives exit to a quantity of glairy discharge. Distension and absorption of the alveoli go on as the cysts increase in size, so that the walls at length become membranous, and the macerated bone shows great gaps in outline. A remarkable point is the length of time over which they may extend without injuring the patient, except by inconvenience.

Tumors. Neoplasms. Non-Malignant.—Fibromata of the jaws resemble fibromata of other parts, but they have two origins: the periosteal, springing generally from the alveolus, and indistinguishable except by its size from epulis; and the endosteal, which springs from the interior of the bone and in the upper jaw, generally makes its way into the antrum and nasal cavities, or in the lower jaw expands the inner and outer plates of compact bone. Fibromata seem to owe their origin, in many cases, to the irritation of decayed teeth, which may sometimes be found imbedded in the growth or displaced by it. The growths produce absorption by pressure, and may in this way destroy a great deal of structure.

Epulides are of two kinds, fibrous and sarcomatous.

The fibrous epulis starts from the periosteum of the jaw, and is covered by the epithelium of the gum.

The growth consists of long fasciculi of white fibrous tissue, which

have a radiating arrangement, in many cases, from the point of growth; the most noticeable feature is the length and slenderness of the fibrous fasciculi and their loose felted arrangement. Epulides depend for their hardness on the amount of fibrous tissue they contain.

Angiomata may also occur, and I know of one case growing from the posterior wall of the antrum which was diagnosed as osteo-sarcoma by a most competent physician and surgeon. The true nature of the growth is shown here by two micro-photographs, taken from the specimen before it was hardened, and it will easily classify itself into a fibro-angioma, showing two distinct kinds of structure, the fibrous and the angiomatous, thus accounting for the excessive hemorrhage which occurred during the operation.

It is well to remember that we may have both simple, cavernous lymphangioma, and angio-sarcoma.

Enchondromata are less frequent in occurrence in the jaws than fibromata, and like them may for convenience be divided into periosteal and endosteal. The disease usually appears early in life, springing from the surface of either jaw, or from the antrum, or the interior of the lower jaw, and has a more steady and more rapid growth than fibromata.

In the case of the superior maxilla the growth is more tuberos, and is apt to send off processes into the fissures and cavities of the skull, giving rise to great deformity. Enchondromata as regards their micro-structure vary greatly, and we must prepare for many enigmas in studying them. Whenever chondroma is associated with sarcoma it seems to take an erratic course; when, however, a pure chondroma is found, it is always more near the normal type of cartilage. All the chondromata are very liable to calcification, and they sometimes undergo a softening process and small cysts form in them.

Osteomata are a further step in the development described under chondromata. They are formed from newly developed connective tissue, and it is a fact which distinguishes them from so-called ossified inflammatory products. After decalcification under the microscope they resemble true bone, and like it can be divided into hard and cancellous. Many, however, vary a good deal from the normal type, especially the hard variety, which is sometimes extremely dense.

Osteomata have been described as primary growths, but are extremely rare. True bone is sometimes found in cartilaginous and fibrous tumors, and also in sarcoma, as the myeloid variety. The cancellous osteoma is the simplest form, and due usually to a misplaced tooth; and the fact that numerous serious operations have been performed in these cases should make every one extremely careful in their diagnosis. The growth is slow and reaches a large size, but when removed by section of the healthy bone it shows no tendency to recur.

Under the term cystic sarcoma many varieties of growths were classed, and by some authors termed a variety of epithelioma (see Mr. Eve, in Erasmus Wilson Lectures for 1882), but they differ so completely from the ordinary form as to rapidity and recurrence after removal that as yet further observations must be made before any decision can be arrived at.

The largest and most dangerous class of growths met with are the

sarcomata, divided into three classes by the shape of their cells: (*a*) round, (*b*) spindle, (*c*) myeloid. And these have again a number of modifications and varieties. As the general features are so well known, little or no description will be given beyond a few points of interest which may occur in them. The spindle-celled sarcoma is quite frequent, forming many of the specimens so indiscriminately named "osteosarcoma." A point worthy of notice in the recurrent growths is the tendency to become softer with each recurrence, and the patient dies, worn out, with rarely secondary deposits in internal organs.

Round-celled sarcoma has, unfortunately, not been clearly defined in oral surgery until the progress in pathology became so marked, and even now it is often incorrectly named. It is still called encephaloid sarcoma of Cornil and Ranvier and others, when we to-day usually regard encephaloid not as of the sarcoma, but of the carcinoma group, as it originates from glandular epithelium.

Many of the cases called "medullary" cancer of the jaw belong to the class of round-celled sarcoma. Myeloid sarcoma, originally described by Paget, is very common, and found in connection with the alveolus, forming the so-called myeloid epulis, and also in the interior of the lower jaw. The growths vary enormously histologically. In the first place, they get their name from the large cells they contain, which closely resemble those found in the marrow of bone, and usually are known by their red color, resembling raw beef, and named by Butlin a mixed-celled sarcoma. In connection with the pure form of myeloid sarcoma we have myxomatous tissue and bony formation of ossification closely combined. The ossification is usually a peculiar form, as the material formed resembles decalcified bone, as it contains no lime-salts. By using double and triple staining processes, the different reactions in the normal formation can be made out very nicely, and the lime deposited by each individual cell; but in the sarcomatous form of ossification it so far has not been shown. The ossifying process must not be confounded with cases where the growing sarcoma has decalcified the bone in its immediate neighborhood; this is sometimes the case, especially in bones like the scapula, and portions of this in the middle of a sarcomatous growth will cut like fibrous tissue without any decalcifying process. Under the microscope this can readily be made out; the lacunæ in them are larger and often empty, and there are no osteoblasts on their free edges. That sarcoma has a decalcifying power is seen in China, where the jaws of horses are so often attacked and so softened that you can cut through them with an ordinary knife, just like cutting a piece of cheese. Myeloid sarcoma also forms one kind of epulis, and care must be taken in making a diagnosis.

Besides these forms, we have alveolar sarcoma, which is a rare and unsatisfactorily described growth. By Wedl it is called "a fibrous form of cancer arising from bone," and should be included under cases hitherto given as scirrhus of bone, which is not strictly correct.

Fibro-sarcoma grows beneath the periosteum, and closely resembles fibroma.

Chondro-sarcoma is a mixed growth, and occurs in both jaws and frequently leads to secondary deposits in the lungs.

Ossifying sarcoma has been classed for greater convenience under the enchondromata and osteomata and myeloid sarcoma.

may be benign, rather than take the chance of letting a malignant growth increase, and so endanger the life of the patient.

The tumors most frequently seen are called epuloid, and he thought the one described by the essayist to have been of that character. These are not usually malignant, but they sometimes take on a malignant character. He could not account for the great swelling in connection with a tumor of this size. Dr. Latham had asked him about it, and he had told her he had not seen such a case; however, she had been informed by other dentists that it was common. His treatment would be the immediate and thorough removal of such a tumor, for fear it would take on a malignant character.

Dr. J. Taft asked how long it had been since the tooth was removed.

Dr. Latham answered, "In February. No other tissue was removed; the tooth came away quite easily, and the cavity healed up very nicely."

Dr. Taft said this emphasizes the danger of making more of a case than belongs to it. If the parts returned to a healthy state, it would eliminate any idea of malignancy. In diagnosing and treating such cases, much attention should be paid to the physical characteristics of the patient. If his condition is generally good, it is safe to consider that the tumor is of a benign character, while a tumor of the same appearance and character in one whose system was diseased would probably take on a malignant character.

He had been called upon to assist a physician remove what the physician called an epulis. To his surprise the physician removed the cuspid and bicuspid, then took a saw and cut out a notch, including the sockets of the two teeth. His own treatment would have been to have considered the growth a little, insignificant, benign epulis, and he would have removed it with a pair of scissors. He spoke of several cases of this kind in his own practice, and said it was well not to be too hasty in pronouncing a growth of this character malignant. The growth, origin, and causes should be studied, and the case kept under careful observation for some time.

Dr. Marshall said the only positive way to diagnose a tumor is by the microscope. When the tumor is large enough, and of such a character that a piece can be cut from it with the scissors, he examines it himself, and has it examined by some one in whom he has confidence; and if it is pronounced malignant, then he removes it, going deeply enough to be sure of removing all the affected tissue. By prompt and thorough removal the life of the patient may be saved, but if operation is deferred till the disease has invaded the glands the growths will return at the same or at some other place, and the life of the patient will not be for long.

He related the case of a patient, a man about sixty years of age, with an epuloid tumor between the first and second bicuspid on the right lower side. There was considerable ulceration, involving gums and cheek almost to the corner of the mouth. On examination it was pronounced an epithelioma. He made a most thorough operation, removing those teeth, the alveolus down to the dental canal, and part of the cheek. The parts healed nicely, the wound in the cheek by first intention; and fifteen months having passed since the operation, there has been no recurrence of the growth. He, however, expected that if the man lived a few years it would recur, either where it was before or in some other place.

Dr. Taft said the class of patients operated upon in general hospitals was so far below the class that a dentist or a physician would have in his private practice, that it was not safe to accept what was true of one class as applying to the other. Hospital patients were to a very large extent little more than wrecks; their whole systems broken down by poverty, vice, and disease, no vigor or recuperative power, and a disease which could be safely handled and cured under better circumstances was well-nigh hopeless with them.

He spoke of a case in his practice of a girl with a tumor on her jaw as large as a pigeon's egg. Relief was sought because of the rapidity of the growth. Upon examination, Dr. Taft thought it not malignant. Two surgeons were consulted. The first one, after a careful examination, said he could not decide; the second, after looking at it two minutes, said it was malignant, and unless the whole side of the jaw was removed the girl would die. The decision arrived at, however, was to merely remove the tumor and carefully watch the case. Some time after the tumor returned, and electrolysis was used, and it entirely healed up and never recurred. If the advice of surgeon number two had been taken, and the girl's jaw sawed away, she would have been mutilated for life. He spoke of the great importance of the dentist being able to judge of the character of such growths. They come under the notice of the dentist more frequently in the early stages than they do the notice of the general practitioner. The best manner of removing them, when small and of a favorable shape, is by a ligature. This is painless, and saves what sometimes would be an alarming loss of blood. The patient should be carefully treated before and after the operation, so as to get and keep the system in the best possible condition.

Dr. E. S. Talbot spoke of the growth of secondary dentine, as shown in the case of which Dr. Latham spoke. These growths are difficult to diagnose, and produce periostitis and neuralgia. They are most frequent in the pulp-chamber and root-canal, and neuralgia results. The only treatment in such a case as reported by Dr. Latham is the removal of the tooth.

Dr. J. S. Marshall spoke of the formation of calcific deposits in the pulp-chamber, and said that, as a rule, peripheral calcifications do not give any trouble, but the interstitial form always makes trouble. One reason that they are difficult to diagnose is that the patient cannot place the seat of the trouble, though sometimes the tooth feels big.

Dr. A. E. Baldwin said that it was best, when in doubt, to treat an epuloid growth as if it were malignant, as it was better to go too deep than by taking the other course to endanger the life of the patient. We should, however, take advantage of the knowledge of other physicians when attainable, and, above all other things, fit ourselves to be able to discriminate by a wider and deeper course of study and research. The whole field of microscopy is opened by such a subject as this, and it is only the intense and rapid student that can take advantage of the facilities for learning that come to our hands. He spoke of a case of his own which he thought was a simple, harmless growth, but took advantage of the offer of a friendly microscopist to examine it, when it was found to be malignant, and so he operated accordingly.

Dr. Latham, in closing the discussion, said that there were some dentists who never looked further than the tooth on which they were working, and she thought they should be more careful to examine the whole mouth and note every appearance of disease, thereby serving their patient better. She spoke of a case in her own practice where she had discovered an epithelioma which would be removed by a surgeon. She thought that it was dangerous, however, for a dentist to undertake the treatment of growths in the mouth by means of caustics or other remedies, unless he had sufficient knowledge to discriminate between harmless and malignant tumors.

(To be continued.)

CONNECTICUT DENTAL COMMISSIONERS.

THE following Dental Commissioners for the State of Connecticut have been appointed by Governor Morris :

James McManus, of Hartford ; William J. Rider, of Danbury ; Civilian Fones, of Bridgeport ; General Charles P. Graham, of Middletown ; and Richard W. Browne, of New London, all for two years from July 1, 1893, and until their successors shall have been appointed and qualified. The members of the board were appointed on recommendation of the State Dental Association.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF MICHIGAN—COLLEGE OF DENTAL SURGERY.

THE annual commencement exercises of the College of Dental Surgery of the University of Michigan were held, in connection with those of the other departments of the university, at Ann Arbor, Mich., on Thursday, June 29, 1893.

The commencement oration was delivered by Charles Dudley Warner, L.H.D

The degree of D.D.S. was conferred upon the following graduates :

Charles W. Adamson.	Elisha D. Hinkley.	Weston A. V. Price.
Alexander R. Allen.	Frank S. James.	Greenbury A. Rawlings.
Arthur W. Ball.	Richard D. Jones.	John G. Schindler.
Frank I. Ball.	John W. Kasbeer.	Frank E. Seybold.
Frank W. Boyer.	Herman Kreit.	Louis N. Seymour.
Herbert J. Burke.	Arthur F. Lentz.	Edward G. Snodgrass.
Charles A. Church.	George B. Little.	John F. Spring.
William J. Clark.	Edward B. Lodge.	Milton R. Stimson.
William A. Conlan.	John A. McAlister.	Burt S. Sutherland.
John A. Cook.	Robert D. McBride.	Sherman H. Swift.
Milton J. Cook.	William McFarlane.	Will H. Van Deman.
Harry D. Geiger.	John M. McIlvain.	John H. Van den Berg.
Eugene M. Graves.	Jesse J. McMullen.	Wm. H. Van Iverstine.
James Grey.	Thomas B. Mercer.	Milton T. Watson.
Charles A. Hawley.	Walter S. Moore.	Will L. Webster.
Marcellus G. Hillman.	Mason Moyer.	Henry D. Wilber.
William S. Hinkley.	Ethelwyn Phillips.	Vernon A. Williams.
Burdette C. Hinkley.	Fred. M. Prettyman.	

HARVARD UNIVERSITY—DENTAL DEPARTMENT.

THE commencement of the Dental School of Harvard University took place on Wednesday, June 28, beginning at 10.30, in connection with the other schools of the university.

The exercises were held in Sanders Hall, as usual, President Eliot presiding.

There were fourteen graduates.

DENTAL SOCIETY ANNOUNCEMENTS.

DENTAL MEETING HALL IN CHICAGO.

FOR the accommodation of the different dental associations which are to meet in Chicago *before the convening of the World's Columbian Dental Congress*, I have secured the Kindergarten College Hall, 10 Van Buren street, which can be used for all meetings for which rooms are desired.

For further information, address

J. N. CROUSE, *Chairman*,
2231 Prairie ave., Chicago, Ill.

AMERICAN DENTAL ASSOCIATION.

THE thirty-third annual session of the American Dental Association will be held in Kindergarten College Hall, 10 Van Buren street, Chicago, commencing Saturday, August 12, 1893, at ten o'clock A.M.

GEORGE H. CUSHING, *Recording Secretary*.

SOUTHERN DENTAL ASSOCIATION.

THE place for holding the business meeting of the Southern Dental Association, in connection with the Columbian Dental Congress, is the Kindergarten College Hall, 10 Van Buren street. Time is Friday, August 11, at 10 A.M., this being the closest date we could secure prior to the convening of the Dental Congress, which meets the following Monday.

S. W. FOSTER, *Secretary*.

NATIONAL BOARD OF DENTAL EXAMINERS.

THE National Board of Dental Examiners will meet in Kindergarten College Hall, 10 Van Buren street, Chicago, Friday, August 11, 1893, at 10 A.M.

The attention of delegates is called to the following, passed by the National Board, August 5, 1891:

Resolved, That the various State Boards of Dental Examiners be requested each year, in season for the annual meeting, to make to the secretary a written report of their examinations, accompanied by detailed or tabulated statements.

W. E. MAGILL, *President*.

WOMEN'S DENTAL ASSOCIATION OF THE UNITED STATES.

A NATIONAL meeting of the Women's Dental Association of the United States will be held Thursday, August 17, 1893, at 10 A.M., in the Art Palace in Chicago. All interested are cordially invited.

The next regular monthly meeting of the association will be held September 2, at 1300 Arch street, Philadelphia.

ELIZA YERKES, *Recording Secretary*,
4004 Chestnut street, Philadelphia.

VIRGINIA STATE DENTAL ASSOCIATION.

THE twenty-fourth annual session of the Virginia State Dental Association will be held at Charlottesville, beginning at eleven o'clock A.M., Tuesday, August 8, 1893. All dentists in good standing are invited to meet with us, and will receive a cordial welcome.

J. HALL MOORE, *Corresponding Secretary*,
Richmond, Va.

VIRGINIA STATE BOARD OF DENTAL EXAMINERS.

THE Virginia State Board of Dental Examiners will meet at Charlottesville, Thursday, August 10, 1893, to examine candidates to practice dentistry in Virginia. Only graduates of reputable dental colleges are eligible to examination. For particulars, address

W. E. NORRIS, *Secretary*,
Charlottesville, Va.

INTERNATIONAL MEDICAL CONGRESS AT ROME.

DR. NORMAN W. KINGSLEY, who is now in Europe, contradicts by authority the rumor published by some journals a few weeks ago, that the International Medical Congress of 1893 at Rome is postponed. It will certainly begin on the 24th of September, and the Odontological Section promises to be of more interest than that of any preceding congress.

EDITORIAL.

THE ENGLISH DENTAL EXCLUSION ACT.

THE General Medical Council of Great Britain, on the closing day of its spring session, Monday, May 29, passed the following resolution: "(A) That the recognition of the certificates of the degrees of Doctor of Dental Medicine of the University of Harvard, and Doctor of Dental Surgery of the University of Michigan, by the General Council be suspended until further notice, and that the Registrar be instructed to refuse registration of each certificate. (B) That a copy of the

report (without the last paragraph) be forwarded to the authorities of the bodies concerned."

This action of the governing medical body of England was brought about through the efforts of some seventeen prominent English dentists, Licentiates of Dental Surgery of the Royal College of Surgeons, who united in a memorial to the General Medical Council suggesting the course pursued, because "no foreign dental diploma testified so complete and so lengthened an education as the United Kingdom qualification," and because "the great advances which have been made from time to time in our [English] educational standard have rendered the inequality still more marked." In further explanation, the memorial recites that "after the passing of the *Dentists' Act* in 1878, and the settlement of the dental curriculum of the United Kingdom by the Medical Council, it was considered desirable on the ground of professional amenity to recognize, 'for the time being,' the Harvard and Michigan qualification as those which, though falling short, made the nearest approach to our own standard, thus waiving for a time equality of qualification as between United Kingdom and foreign qualifications in favor of the applicant for registration.

"The preliminary examination demanded by these colleges is, as may be seen from their own prospectuses, of such a nature as to fall far below the standard required from the dental students of this country; and further, these examinations are in some instances committed to the care of individuals who have no kind of responsibility nor any claim to be considered competent for such an office."

It was upon the representations here quoted that the resolution was had which excludes graduates of all foreign colleges from registration in England upon the evidence of their certificates or diplomas.

This action of the General Medical Council of Great Britain is not unexpected. A growing dissatisfaction in the minds of English dentists with respect to the recognition of American diplomas as coequal with their own has been for some time evident. Now that this feeling has taken the form of an authoritative pronouncement by their official governing body, it is fitting that we should examine the nature of the act, and consider some of its possible consequences.

As a definition of the English estimate of the status of their own practitioners compared with that of American dentists, the record of the meeting of the General Medical Council leaves nothing to be desired in point of clearness. It is exact and unequivocal. It says, in effect, the system of education which is pursued by dental students in England is better than any other, our graduates are better qualified than any other to practice dentistry, and therefore we refuse to admit to the privileges of practice within our borders any dentist who has been trained outside of our own country.

We have been so long accustomed to hearing about and believing in the superiority of American dental methods, both educational and practical, that the contemplation of this official assertion of the superiority of our English brethren may at first sight tend to rouse a certain amount of resentment; but as any action based upon such feeling invariably comes to nought save bitterness and strife, it is far better to judge the case on its merits, and profit by whatever of truth and equity an unprejudiced investigation of the situation may bring out. We are not sufficiently informed as to the details of the English dental curriculum to warrant us in judging of its practical value, hence from that standpoint we are not in a position to intelligently criticise this action of the General Medical Council. But while one may hesitate, from lack of special knowledge, to essay the rôle of critic, he may be allowed to express his opinion based on what knowledge he may possess. The subject presents two distinct elements which may serve as the basis of contention. First, the assumption of superiority of the English dental curriculum, with its necessary implication that this same superiority is a characteristic of the product of that curriculum; and secondly, the justice of their exclusion act, which is also based upon this asserted superiority as noted. If we grant the major premise of English superiority in dental educational matters, then the justice and consistency of the exclusion act admit of no further argument. It is simply a legitimate exercise, under the sovereignty of the state, of its proper authority, everywhere conceded among intelligent people as necessary and right for the protection of its citizens. Nowhere is this power more fully recognized and respected than by the people of the United States, and nowhere have we better examples, as applied to the present issue, of the exercise of this same kind of authority than in the oftentimes conflicting legislation affecting dental education and practice in the several states of our Union. It is the various interpretations of this power and the lack of a common standard of requirements which produce inharmony, and so often lead to difficulty in interstate relations in dentistry. Furthermore, the official abrogation of the recognition which was previously accorded to the graduates of the only two American colleges which from the English standpoint were deemed worthy of such distinction, is an act which is perfectly consistent, whether estimated wholly from the English point of view or regarded exclusively from the American. Nor will the consistency of the act probably be questioned by any, with the possible exception of the colleges immediately concerned, for the simple reason that under the previous regulation an invidious distinction as to fitness and reputation was made between the two selected colleges on the one hand, and the remainder of those represented in the National Association of College Faculties on the other. It is true that the two colleges

which formerly enjoyed English recognition acquired it by virtue of their obligatory entrance examination ; but the grounds for such distinction ceased to exist a number of years ago, and this feature is, and has been since 1884, required by all the colleges now represented in the National Association of College Faculties. The justice of the English dental exclusion act is therefore apparent in so far as it places all American colleges on the same basis with respect to recognition of their diplomas in England.

The issue is, then, much simplified as between the dental professions of this country and England. It is a question of the relative merits of the respective dental educational systems of the two countries. Great Britain has officially asserted her belief in the superiority of her own system, and, consistently with that belief, has excluded all future aspirants to practice within her borders, who do not measure up to the standard of her dental requirements.

The immediate effect of the exclusion act, as related to graduates of American dental colleges, is of secondary importance, for it will affect only those who may desire to practice in England, which number is, and always will be, but an infinitesimal proportion of the whole body of American graduates. The principal importance of the act to us is the fact that it not only calls in question the qualifications of our graduates, but pointedly and openly asserts their inferiority to the graduate under the English curriculum. We cannot see that any other inference is possible, and this is the issue upon which the dispute must take place.

The settlement of the question will necessarily rest upon one's belief as to what qualifications and attainments are essential to the proper equipment of a dentist in order to fit him for the intelligent and skillful performance of his calling, which calling we believe to be primarily the service of the community in which his lot is cast, by rendering them the best care which the science and art of dentistry has to offer in connection with the oral cavity. We believe that such service has been and is being rendered everywhere by graduates of American dental colleges,—not by all graduates of American dental colleges, but by a larger proportion of them and to a higher degree of perfection than by the graduates of any colleges anywhere outside of America. There are, unfortunately, those who “profess and call themselves” American dentists who have no right to the title ; but where the title has been fairly won, it has been, and will continue to be, the Open Sesame to public confidence and its possessor's badge of superior ability. That there have been and are defects in the system of dental education pursued in this country is true, and the knowledge of these imperfections is nowhere more keenly felt than by the institutions themselves. The effort is active and persistent—more so at present

than ever before—which is constantly effecting improvements that are fast raising the educational standard of dentistry in this country to a plane beyond successful cavil.

The value of a stringent examination preliminary to the technical dental educational curriculum is not questioned ; but the nature of such preliminary examination as to scope and details is one which requires the most careful consideration. We regard it as still unproven that a degree in arts or letters, or their equivalent culture, is a sufficient or necessary prerequisite to the making of a successful practitioner of dentistry, —*i.e.*, successful in the sense which we have before noted.

In a broad sense, such previous culture is beneficial and highly desirable in a dental practitioner, just as it is in a lawyer, a clergyman, or in any man. A stringent enforcement of the rule with respect to such preliminary culture for dentists as is demanded by the General Medical Council of Great Britain must unquestionably tend to the production of a professional body of cultivated dental practitioners ; but that such general culture is *per se* an evidence of their superiority as dentists, we strongly doubt. The function of a preliminary examination is to determine the fitness of a candidate to pursue the curriculum that leads up to a specified calling, which is to be his life-work. This is its essential *raison d'être*, lacking which, it becomes a conspicuous failure and therefore abortional.

Dentistry requires something more for its successful practice than general and technical knowledge ; it demands in the majority of its procedures the highest development of technical skill. A man may be a brilliant genius intellectually and a flat failure as a dentist. He may be a walking encyclopedia of knowledge without the ability to successfully treat or fill a diseased tooth. It is the happy combination of these elements of technical knowledge and manipulative skill in the individual which places him in the front rank of superior dentists. Therefore, if a preliminary examination is to have any value in testing the fitness of a candidate to enter upon the dental curriculum, it must satisfactorily determine whether he is possessed of those qualities, natural or acquired, which make him capable of further acquiring that high degree of manipulative skill which it is the function of the dental curriculum to impart.

Such a knowledge of the fitness of a candidate we believe can be better acquired by a preliminary examination modeled upon that of the final examinations of our highest grade manual training schools, which require, besides history, languages, mathematics, English, a good working knowledge of the physical sciences and drawing, etc., a practical demonstration of the manual dexterity of the student, which tests his knowledge of tools, their manufacture and uses, coupled with

a full degree of familiarity with the physical properties of the materials upon which the tools are used, and a practical knowledge of the constructive uses to which these same materials are put. It is along this line that the technical part of the dental curriculum is being developed, and there is every reason why the same idea should to a degree be included in the examination which serves as the entrance to that curriculum.

There is much in medicine that is essential to dentistry, whether we regard the latter as a medical specialty or otherwise ; but the successful practice of dentistry involves a training which has no analogue in medical training, and so long as dental educators are content with pursuing educational methods which are a servile imitation of those pursued in general medicine, so long will the training of their students be imperfect.

Dentists, like poets, are born, not made. Natural characteristics and inherent tendencies are the bases upon which are established the sum-total of attributes which comprise the make-up of the superior dentist. The preliminary examination should therefore be selective in quality, and directed toward the discovery of the natural qualifications of the candidate and his fitness for entrance upon the dental curriculum,—not whether he is fit to study law, medicine, or theology, which might be as easily deduced from the test afforded by the dental preliminary examination of England, and still not determine the fitness of the candidate for the pursuit of dentistry as a life-work.

If it should be found that an educational plan as elaborate as that of England is the one which produces the best practitioner of dentistry, such a plan would be quickly adopted here ; but that such is the case has not yet been shown in America, nor does it appear to have been demonstrated in England,—for if it were so, the superiority of the English dentist would be everywhere acknowledged. The value of any method, as well as of any machine, is to be judged by the character of its product ; and we still think that the plan of dental education pursued by the reputable colleges of America, judged by the character of their product, is and always has been, even with full recognition of its defects, capable of producing practitioners of dentistry whose excellence as dentists has never before been called in question.

There is one by-product of this English dental exclusion act which probably was not provided for in the original measure, but which has already made itself manifest in the development of a pharisaical attitude on the part of some of the dental profession of England with respect to American dentistry. We use the term pharisaical as exemplified in the Biblical parable. Such an attitude is, no doubt, the

outgrowth of pardonable human weakness, but it is a beam in the eye of our British brethren, so manifestly a part and parcel of the mote which they have attempted to pluck out of our American eye, that we marvel they did not see the resemblance.

The British Dental Association, at its Birmingham meeting, took action with reference to the official representation of that association at the World's Columbian Dental Congress. Mr. J. Smith Turner offered the following resolution, which, being duly seconded by Mr. J. J. Holford, was, after some discussion, put and carried: "That this Association do not send any delegates to the Columbian Dental Congress." Mr. J. Smith Turner had read a circular issued by the World's Congress Auxiliary, containing statements made by Judge Charles C. Bonney, president of the Auxiliary, to the effect that "scientific dentistry had its birthplace in the United States of America"; that "this country has the proud distinction of having organized the first school for the teaching of dental science, and the establishment of the first periodical journal devoted to the interests of dentistry, whilst very many of the most useful appliances and scientific methods have originated on this side of the Atlantic." No discussion ensued as to the truthfulness of these assertions, but the reading of them aroused the patriotism of some of the members to an extent which seems to have obscured their calmness of judgment. Mr. J. Smith Turner "was not," so the official report states, "going to criticise the contents of the circular, but it had been sent to him under three different headings from different committees. He would also emphasize the fact that he was solicited and refused to be either a British representative or to accept the position of honorary president to the Advisory Council of the Columbian Dental Congress. He did it because of the assumed superiority of American dentistry. They might assume it as long as they liked, but when they came and asked him to subscribe to it, directly or indirectly, by delegates or personal attendance, he would say 'No.' He did not deprecate the Americans one bit; they were entitled to their own views on the matter; but they must not expect him to say yes to all these assertions. If he were to go over there from the Association, he would be subscribing to all these statements, a thing he could not possibly do."

Now, we feel sorry that Mr. J. Smith Turner was so imperfectly informed, because if he had taken the trouble to investigate the situation he would not have stampeded the entire British Dental Association by his ingenious explanation of their imminent danger of officially acknowledging the superiority of American dentistry.

The circular which contains the offensive clauses never received the sanction of the Executive Committee of the World's Columbian Dental Congress, nor did the Executive Committee ever request the

British Dental Association, or any other association, to send delegates officially. Only one kind of invitation has been issued, and that to all reputable dentists of the world, which does not include any provision that they shall subscribe, directly or indirectly, to the sentiments in Judge Bonney's circular which gave offense to Mr. J. Smith Turner and those of the British Dental Association who were persuaded to his view of the case. We see no reason why they could not have accepted the invitation to attend the Congress, and still "maintain in silence" whatever ideas they may entertain respecting American dentistry, "with that reserve which becomes a professional man."

The record shows that but a small minority of those in attendance upon the meeting of the British Dental Association voted in favor of the resolution. We are loath to believe that their action represented the feeling of the meeting, much less the feeling of the dental profession of Great Britain. There was an evident lack of knowledge of the facts of the situation in the minds of those present. But the dental profession of England will profit by the results of the World's Columbian Dental Congress just as will all other practitioners of dentistry, since the published transactions will be accessible to all. We would, however, suggest to our friends of the British Dental Association that their intellectual profit would have been greater, and their knowledge of American methods in dentistry both educational and otherwise, their understanding of the American spirit of good-will and hospitality, as well as their estimate of the status of the American dental practitioner, would have been immensely enlarged if they had set aside, for the time being at least, the feeling of prejudice, and personally experienced the benefits derived from a visit to the World's Columbian Dental Congress, where from the free interchange of the best thought of all countries the greatest good to dentistry must result.

OBITUARY.

DR. W. W. ALLPORT.

FOLLOWING is the report of the committee appointed by the Odontographic Society of Chicago to take action on the death of Dr. W. W. Allport:

The death of Dr. W. W. Allport removes from our midst one of the most conspicuous and interesting figures in the dental profession of America. No man practicing dentistry contemporary with him was probably more widely known than he. For nearly half a century he was so closely associated with the profession that his name is connected with many of its most important advances. He loved his profession better than most men are capable of loving a calling, and at all times was zealous in his advocacy of what he believed to be for its best interests.

When death claims a man like this, it behooves the younger members of the profession to lay well to heart the lessons of his life. We as a society, composed largely of young men, looking back at him as we all remember him, may discover many traits that it were well to emulate. We can see the

embodiment of energy, we can see a brilliancy of attainment and a buoyancy of spirit which go to make a successful and progressive man; and in these things we find something worthy of imitation. We cannot all be as brilliant as he, but we can try to be.

In view of the fact that Dr. Allport was an honorary member of this society, and was always in unity and sympathy with the young men, we deem it appropriate on this occasion to express our regrets at his death, and to record our high appreciation of his many sterling qualities, both as a man and a dentist.

C. N. JOHNSON,	} <i>Committee.</i>
EDMUND NOYES,	
H. H. WILSON,	

PERISCOPE.

ACTINOMYCOSIS HOMINIS.—Dr. Justus Ohage, in writing on this subject, says that actinomycosis in man is one of the so-called modern diseases,—that is, its recognition, description, and understanding are due to modern investigation and discoveries.

The first to recognize this disease was James Israel, in Berlin, in 1878. He published his observations in vol. lxxiv, *Virchow's Archiv*. Ponfick, of Breslau, gave a fuller description of it in 1879, and was the first to demonstrate that the disease in man was really due to a fungus, the actinomyces first discovered in 1877 by Bollinger in the jaw of cattle. Since then numerous observations have been published, and this disease has obtained full pathological recognition. Actinomycosis is more frequent in Europe than here,—at least it is oftener diagnosed and recognized over there; still the disease is common enough in this country to demand the attention of the medical profession.

The disease is produced by the entrance of a vegetable parasite or fungus into the system. The ray-like arrangement of its elements caused Harz to name it actinomyces,—“aktis,” ray, “mykis,” fungus. The experimental researches of Ponfick, DeBray, and Pringsheim have conclusively shown that this fungus is the true *causa morbi* of the disease in question, and have proved the identity of it in man, cattle, and hogs beyond any doubt.

The diseases with which actinomycosis is most often confounded are tuberculosis and epithelial cancer. It gains its entrance into the system in various ways. The fungi may enter with various kinds of food, by inspiration, etc., and according to the channels through which they entered the system the symptoms of the disease make themselves manifest. We have thus actinomycosis of the lungs, the kidneys, the bowels, the stomach, etc.

Most cases of actinomycosis in man have their starting-point in decayed teeth and diseased tonsils. From here the fungus is distributed through the organism and begins the destruction of the organs on which it has settled. The protean character of this disease is indigenous to man only, while in the lower animals, cattle and hogs, its predilection is for the jaw. There is another peculiarity: the tendency to the formation of tumors in animals is entirely absent in man. On the contrary, the granular tissues produced by the phlogogenous action of the fungus tend to fatty degeneration and decay. In an insidious and chronic manner the fungi penetrate the tissues, destroying them in their onward march, and unless the perforation of some vital organ—as the stomach, or the bowels, or the lungs—cuts life short, the mode of death is generally that by pyemia.

The diagnosis of the disease during life is comparatively easy if the ravages of the fungus are visible to the eye. A peculiar form of small yellow bodies is always found in the pus, fistulæ, and swellings; it is unmistakable after once having been seen. On microscopical examination they seem to consist of threads terminating in bulbous ends. The threads radiate from the center, thus giving the fungus a ray-like appearance.

When internal organs are attacked, hidden from view and inaccessible to observation, the diagnosis is impossible.

The prognosis and treatment of actinomycosis is based upon its indigenous properties. As it is a local fungus-disease, not constitutional like syphilis and tuberculosis, it is curable if all the infected tissues can be removed. Where that cannot be done a fatal termination is inevitable.—*Northwestern Lancet*.

A NEW METHOD OF MANIPULATION FOR REPLACEMENT OF THE DISLOCATED LOWER JAW.—Roth (*Lancet*, No. 3626, 1893) describes the following method of reducing luxation of the lower jaw :

The patient is seated in an ordinary cane-bottomed chair ; the operator stands before him with one foot placed slightly to the right side and the other just in front of the patient and in the middle line. The operator is thus on a firm basis, with the legs well apart and fully extended. He then flexes himself at the hips, and asks the patient to lean forward and to place his forehead in the middle of the sternum of the operator's chest (but this position varies with the size of the patient's head). The operator now flexes his head so that his chin grips the patient's head about the upper part of the occipital bone ; he thus acquires a firm hold, and has the head well under control between his chin and chest. The thumbs, protected in the usual manner, are placed in the patient's mouth, and the fingers of both hands grasp the lower jaw. In this position reduction is facilitated, and the advantages over the ordinary methods are as follows : 1, the operator has the head under perfect control and perfectly fixed ; 2, the line of force exerted by the operator's hands acts in the same line as the resisting force exerted by the operator's chin ; 3, the operator's elbows being well flexed, he can exert a greater power by the force acting through the thumbs being close to the shoulders, and it will be found that he has greater power of muscular action in the terminal phalanges of the same ; 4, the patient's head is also in a better position for replacing a dislocated jaw ; 5, the operator needs no assistant, and does not inconvenience his patient by the excessive pushing and pulling about of the head during the reduction.—*Therapeutic Gazette*.

THE PRODUCTION OF ANESTHESIA BY THE COMBINED USE OF BROMID OF ETHYL AND CHLOROFORM.—Poiton-Duplessy (*L'Union Médicale*, January 28, 1893) recommends the combined use of bromid of ethyl and chloroform for the prompt and effective production of anesthesia. In the use of this method he claims priority for France. The author advises the following *modus faciendi* : 1. Pour into the cone, or upon a compress, the ethyl bromid, but be careful not to produce too rapid an action ; make the patient breathe from two to five minutes. 2. As soon as the patient begins to lose consciousness (without excitement), and when the face exhibits a condition of congestion and the pupils begin to dilate, substitute chloroform, and pour this in a methodical manner. In this way a complete anesthesia is obtained, sometimes directly, sometimes after a moderate and short period of excitability. 3. In certain cases (especially in alcohol-drinkers), in which this excitation is somewhat exaggerated, it is largely suppressed by the readministration of the bromid of ethyl. In this manner the most inveterate drinkers can be anesthetized. 4. Once the anesthesia is established (with the advent of muscular relaxation, pupillary contraction, and abolition of the oculo-palpebral reflexes), it can easily be prolonged by a small dose of chloroform. According to the writer, with the association of these two anesthetics, whose action on the mucous membranes, on the heart, and on the blood-pressure is absolutely different, the anesthesia is produced, while the toxic effects caused are reduced to a minimum.—*Therapeutic Gazette*.

STEEL INSTRUMENTS can be cleaned so as to look like new, it is reported, by first wiping them with wood-ashes and soft water, so as to remove all traces of fat, placing them for a few seconds in a weak solution of hydrochloric acid (10-15 drops to 30 grams [1 fl.oz.] of water), washing them with clean soft water, placing them into a saturated solution of tin chlorid for ten to twenty-four hours, washing them in plain water, and finally drying them carefully. This procedure is said to make the steel look as if it were nickel-plated.—*Amer. Medico-Surg. Bulletin*.

INJURIOUS CONSTITUENTS OF RUBBER ARTICLES WITH WHICH CHILDREN OF DIFFERENT AGES COME IN CONTACT.—A. Bulowsky (*Archiv für Hygiene*, Bd. xv, Heft 2, p. 125) details a number of experiments made by him to determine what kinds of rubber articles may work injury to children. He disagrees with C. Ewald, who has maintained that vulcanized rubber nipples can injuriously affect infants by causing violent diarrhœas through formation of sulfuretted hydrogen gas, and shows that no such formation occurs. Rubber nipples, teething-rings, dolls, and other toys have often been found to contain varying amounts of lead, oxid of zinc, sulfate of barium, antimony, and other substances. Bulowsky examined seventeen gray rubber nipples, dolls, etc., and found one containing a small amount of lead, and one containing over ten per cent. of sulfate of barium. They all contained from 32.18 to 58.66 per cent. of oxid of zinc. All of these articles sank in water. Thirteen black rubber nipples, rings, etc., yielded but small amounts of mineral matter, none contained lead or zinc, and all floated in water. A black rubber doll which sank in water yielded 47.03 per cent. of ash containing 14.48 per cent. of sulfate of lead. Five red-brown rubber dolls and toys, which sank in water, contained from 7.37 to 26.70 per cent. of sulfid of antimony. None of the above contained any arsenic.

Since small children have a strong tendency to carry everything to their mouths, experiments were made to determine what action the saliva may exert on these constituents of rubber, and what action, if any, may be exerted by milk on rubber nipples. Digestion of ten grammes of finely cut red-brown rubber, from a doll containing 26.70 per cent. of sulfid of antimony, with saliva for twenty-four hours gave no trace of antimony in the saliva. Digestion of eight grammes of another similar doll for forty-eight hours yielded also negative results, showing that antimony in rubber is harmless. Two similar experiments with a black doll containing lead gave traces of lead in the saliva. The ease with which chronic lead-poisoning is produced by small doses of lead must lead to the conclusion that such articles should be regarded as dangerous.

Experiments with a gray doll containing 58.66 per cent. of oxid of zinc showed that saliva will take up traces of zinc. Sour milk was found to exert a similar action on rubber containing 33.71 per cent. of the same substance. According to Oesterlen, Heinzerling, Naunyn, Kobert, and others, small doses of zinc lead to chronic zinc-poisoning. Bulowsky's conclusions are that—

1. Rubber articles are harmless when they float, are elastic, and are of soft consistence.
2. The greater the specific gravity, the greater the ash and the less the value.
3. Black nipples and rings are harmless.
4. Black dolls which sink are dangerous on account of lead.
5. Red and red-brown dolls and toys are harmless.
6. All gray rubber articles, especially those which children put into their mouths to suck, are more or less harmful on account of the contained oxid of zinc.—*American Journal of the Medical Sciences*.

OPERATIVE TREATMENT OF TRIFACIAL NEURALGIA.—Stoker (*Dublin Journal of Medical Science*, March 1, 1893), after discussing the various operative measures employed for the treatment of these neuralgias, states his belief in the following operation as the best: The eyelids are sewn together by a single stitch passed one-quarter of an inch from their ciliary margins. This fixes the part and prevents irritation; a curved incision is carried along the lower edge of the orbit and parallel to it, including the periosteum; an incision connects this with a point over the infra-orbital foramen. The nerve and artery are found and separated; the nerve is clamped in a pair of forceps and divided distally. The periosteum of the orbit is next raised from its floor with a flat director, care being needed to prevent tearing, as it is very thin, and tearing complicates the wound and the results. The contents of the orbit are then raised from its floor by a retractor in the hands of an assistant, and the canal laid open by a pair of bone-forceps; this should be done with care, and not too large an opening made. The nerve is then lifted out and detached

back to the point of exit from the foramen rotundum ; it may be cut or avulsed ; the latter is preferable, as it may influence a seat of disease higher up. The antrum, if opened, is filled with powdered boric acid. Oozing can be stopped by hot sponges. After closure with catgut sutures, without drainage, immediate union should be secured and only a slight scar remain.

The author concludes : 1. That in cases of trifacial neuralgia demanding operative treatment, neurotomy is not usually a satisfactory or efficient operation. 2. That in purely sensory nerves, stretching is at best but a temporary expedient, and either should not be undertaken, or, having once been performed and followed by a return of pain, should not be repeated. 3. That neurectomy is the reasonable and established treatment, but the removing of the Gasserian ganglion must be held under consideration. 4. That avulsion is only to be practiced as a part of a formal open operation, and that otherwise it is a blindfold and an unscientific proceeding.—*American Journal of the Medical Sciences*.

TROPACOCAIN.—Dr. Otto Seifert, taking up the investigation of this drug, which has been studied by Chadbourne [see *The American Journal of the Medical Sciences*, 1892, vol. civ, p. 591], has experimented upon healthy individuals, using a five per cent. solution. Anesthesia of the nasal mucous membrane was produced by three applications, but without great reduction of the volume, although ischæmia was observed, and frequently symptoms of irritation, as burning. One or two applications to the throat and naso-pharynx, and to the larynx, produced anesthesia, but also in one case very marked symptoms of irritation. A ten per cent. solution gave better results, but here also there was a failure to reduce the volume of the mucous membrane. In equal concentration with cocaine it is less poisonous, but operations are not easy on account of the hemorrhage, and this is more difficult to control. These disadvantages then, in spite of its relative harmlessness, prevent its displacing the older drug.—*Internat. klin. Rundschau*, 1893, No. 8, S. 281.

CHLORID OF ETHYL.—Dr. Edgar Gans, of Carlsbad, refers to the experiments by Debove with methyl chlorid as an anesthetic, which acted by refrigeration of the part. Ethyl chlorid, however, has proved more effective. It is a colorless fluid, with a pleasant ethereal odor, and boils at 50° F. It is prepared by treatment of alcohol with hydrochloric acid : $C_2H_5OH + HCl = C_2H_5Cl + H_2O$. The hydroxyl of alcohol is, therefore, replaced by chlorin. Chlorid of ethyl is obtained for use in small closed glass tubes, one end being drawn out into a fine capillary tube. To anesthetize a given surface, the extremity of the capillary tube is broken off, and as the ethyl chlorid boils at 50° F., the heat of the hand is sufficient to force the fluid in a fine spray upon the desired part. The tubes contain about 2½ drachms, which usually is sufficient.

The effect of the spray is first to redden the skin, and then in about a minute to render it completely white. Then a coating of ice is formed in the shape of fine snow. Usually the tube is best held at a distance of about one foot (thirty centimeters) from the spot to be affected.

The remedy is free from disagreeable odor, and no threatening symptoms occurred in Gans's cases. A few nervous individuals experience a peculiar drawing in the extremities and a feeling of confusion, lasting a few seconds.

Gans experimented upon dogs in Professor Liebreich's laboratory, and proved that the remedy, under repeated use, does not produce thickening of the skin, scaling, or gangrene. In one dog, after the use of two tubes, a thermometer showed that the subcutaneous temperature was reduced to 15° to 18° C. (59° to 65° F.).

Gans refers briefly to a number of his cases in which the results obtained were remarkable. One was a case of supra-orbital neuralgia, which had persisted for six weeks with the most violent pain. One application of the ethyl chlorid cured it. In another there was neuralgia of the left mammary gland, which had resisted treatment for five months. The first application caused the pain to disappear completely, but it returned next day, whereupon the application of ethyl chlorid was repeated daily for two weeks ; the patient has been free from pain for ten months.

In a third case, one of lumbago, in a man sixty years old, who was unable to stand erect, one application appears to have worked a cure.

In three cases of beginning gouty attacks the ethyl chlorid appeared to cut short the attack.

In several cases of migraine the pain ceased immediately after the employment of the ethyl chlorid.

In a case of pruritus of the scrotum, in a diabetic forty years old, whose single subjective complaint for five years had been the persistent itching of the scrotum, a single use of ethyl chlorid produced freedom from itching, lasting five weeks.—*Therapeutic Gazette*.

STATISTICS ON THE FATALITIES OCCURRING UNDER THE ADMINISTRATION OF ANESTHETICS.—In the *Wiener Medizinische Wochenschrift*, No 18, 1893, the record of the Committee for the Collective Investigation of the Statistics of Anesthetics, reported to the German Surgical Congress, through Gurlt, again proves that ether is by all means the safest anesthetic. The use of bromid of ethyl resulted in one fatal case in Billroth's clinic. This is as dangerous as chloroform, and is no more serviceable than is nitrous oxid.

König, in discussing these statistics, states that no patient should perish from respiratory failure due to chloroform, but that sudden heart-failure cannot always be prevented. Three patients, who were in grave danger from this, were saved by König by means of his method,—that is, of strong rhythmical blows over the heart region. Occasionally, after a long time, the pulse will be found isochronous with these rhythmical blows.

Von Bardeleben stated that he had used chloroform every year since 1848 in at least one thousand cases annually, and up to the year 1878 he had had no fatal result.

Although Gurlt has collected one hundred and thirty thousand cases of chloroform-narcosis, this number is yet too small to justify definite conclusions.

Küster employed chloroform for twenty-one years, but now uses ether, and is very well satisfied with it. Only in cases of head and neck operations is it troublesome, since here the mask employed can infect the wound, or may be in the operator's way.—*Therapeutic Gazette*.

ARISTOL *VS.* IODOFORM.—Dr. R. H. Gibbons, of Scranton, Pa., has made extensive use of aristol in surgical work with most satisfactory results, his first use of it being in the dressing of the wound resulting from removal of a cancerous mammary gland. The lesion was dressed and closed for eight days, when it was found that complete union had taken place. "Since then," says the author, "I have used aristol for all wound surfaces, exterior and cavital. In all operations about the anus and rectum I have found this remedy of great value. The results which I have obtained in the use of aristol as a protection to wounds and ulcerated surfaces, and also as a stimulation to granulation, have been satisfactory in an extreme degree. In all cases of abdominal surgery I now use aristol, and find it to be the ideal protective, having had no cases of breaking down of the wound of entrance, as has happened in several cases where I have used iodoform."—*Med. Bulletin*.

HINTS, QUERIES, AND COMMENTS.

ARGENTI NITRAS ON BLOTTING-PAPER.—The method of using nitrate of silver on blotting-paper, as suggested by Dr. C. N. Peirce in the *International Dental Journal* for February of this year, I find is open to an objection which may be easily obviated. The method suggested by Dr. Peirce is to saturate blotting-paper with a forty per cent. solution of nitrate of silver, which, after drying, is to be cut up into small pieces of convenient size for application to cavities with hypersensitive dentine.

Dr. Peirce states that in experimenting with stronger solutions of silver nitrate upon cotton fiber he found that the latter was entirely destroyed when dried. This is the point. Exactly the same oxidizing action occurs even with weaker solutions, requiring only a greater length of time. The contact of silver nitrate with vegetable fiber of any sort involves not only a destruction of the fiber, but also of the silver nitrate, so that such a preparation in a short time entirely loses its desirable properties.

With dilute solutions of silver nitrate there may not be a sufficient quantity of the salt in proportion to the fiber to destroy the integrity of the latter, but the excess of organic matter present will lead to the complete decomposition of all the silver salt present, so that in any event, whether a weak or strong solution is used, it will eventually become inert. This difficulty may be easily overcome by using thin asbestos felt, such as Dr. Peirce some years ago recommended as a cavity-lining in connection with zinc-phosphate fillings, as the vehicle for carrying the silver nitrate. The silver salt is without action upon the asbestos fiber, and may be used in much greater strength even to the point of saturation, without any subsequent decomposition of the felt. Before saturating the felt with the concentrated silver solution it should be heated to redness in a Bunsen flame, to burn out any organic matter with which it may be accidentally contaminated, and then charged with silver nitrate as indicated. The resulting felt furnishes a most satisfactory means for applying this valuable agent without danger to the surrounding soft tissues.—EDWARD C. KIRK.

MEDICAL JOURNALISM.—It has always seemed to me desirable to advise those who seek counsel on style to conscientiously avoid it, and to try to chiefly say what they have to say as clearly as possible, and to seek mainly the accurate expression of precisely the shade of meaning which it is intended to depict. It is a golden rule to think out clearly and precisely what there is to say, and to say it shortly and without ambiguity. People who are anxious about style are generally those who have nothing to say, and they are those who take longest in saying it. It is generally difficult to say nothing without saying it at great length, and medical stylists are the bores of the profession and the terror of the medical journalist. On the other hand, nothing will compensate for the want of clear grammatical expression, nor is there any department of journalism in which pompous rhetoric and the straining after jocosity is less graceful than in medical journalism.—MR. ERNEST HART, *Editor British Medical Journal*.

QUININ SULFATE APPLICATIONS IN PYORRHEA.—Professor James Truman, in the *International Dental Journal* for July, strongly advocates the use of quinin sulfate as a topical application in pyorrhea pockets, having found it to be of great efficacy because of its non-irritant, antiseptic qualities. In addition to these he states, upon the authority of Benz, Scharrenbroich, Kerner, and others, that the drug when combined with human blood at once arrests the diapedesis of white blood-corpuscles,—probably by the contraction of the arterioles, which Dr. H. A. Hare has observed in the cinchonized frog. The application is made by Dr. Truman in the form of a paste of the drug with water directly to the pockets, with results so satisfactory that it has become a "standard therapeutic agent" with him in the treatment of pyorrhea.

In *Nouveaux Remèdes* for April 8, there is mentioned an article by Dr.

Alfödi, published in the *Pester Medicinisch-Chirurgische Presse* and summarized in the February number of the *Therapeutische Monatshefte*, who is convinced that a one per cent. solution of quinin sulfate is a more rapid detergent and cicatrizant in cases of infected wounds than either corrosive sublimate or iodoform. He adds that wounds that are free from infection also heal with astonishing rapidity under the use of quinin applications.

SOLDERING ALUMINUM.—*Der Techniker*, July 1, says that J. Novel, of Paris, recommends the following solders for aluminum :

- | | | |
|--------------------------|----------------|---------------------|
| I. Pure tin | | melting point 250°. |
| II. 1000 grams pure tin, | 50 grams lead, | " " 280-300°. |
| III. 1000 " " " 50 " tin | " " " | 280-320°. |

These do not discolor the aluminum, but leave its surface quite intact, and are therefore well adapted for the manufacture of ornamental articles, etc.

IV. 1000 grams pure tin, 10-15 grams copper, melting-point 350-450°.

V. 1000 " " " 10-15 " nickel " " 350-450°.

Solders IV and V color the aluminum yellowish-black ; they possess, however, a greater degree of strength, and are especially adapted for the manufacture of such articles as have heretofore been made with tinned iron, white metal, copper, zinc, brass, nickel, etc., as well as for all aluminum articles which may be used in building work, and which are now constructed of zinc, white metal, and lead.

In contrast with the rapidly oxidizable metals aluminum possesses an almost unlimited durability.

VI. 900 grams pure tin, 100 grams copper, 2-3 bismuth, melting-point 350-450°.

This yellow solder is adapted for the soldering of aluminum bronze. The color may be changed by the addition of more or less copper. By varying the amount of bismuth a melting-point may be obtained which permits of the use of the soldering-iron. This solder is also adapted for the soldering of aluminum to copper, zinc, brass, iron, white metal, nickel, etc.

TO THE EDITOR OF THE DENTAL COSMOS.

Sir,—In Dr. Barrett's paper on pyorrhea alveolaris, which is published in the June COSMOS, he makes certain statements which seem to me to be of great importance, if they are based upon correct observation and are therefore true. I refer to the explanation which he gives (page 528) of the formation of carbonate of calcium in tartar, as follows : "The calcium is held in solution in the saliva by an acid, which in a healthy, normal condition it nearly neutralizes. Coming in contact with the carbon dioxid of the breath, a carbonate is formed, which is precipitated."

This hypothesis seems to me to involve incorrect reasoning from a meager knowledge of chemistry. It is a well-established fact that carbon dioxid, or its hydrate, carbonic acid, is not capable, so far as is known, of displacing any other acid from its basic combinations, and there is therefore no reason to believe that the carbon dioxid of the breath can bring about a decomposition of the calcium salt of any acid with which the calcium may be combined in the blood, to form a carbonate.

The statement that the calcium "nearly" neutralizes the acid in the blood is an extremely weak point in the hypothesis, for if the acid were not completely neutralized, it necessarily follows that some free acid must exist, and

no addition of carbon dioxid would or could possibly precipitate calcium carbonate from any solution containing an excess of another acid.

It would seem, then, that the presence of calcium carbonate in salivary tartar must be accounted for upon other grounds.

Dr. Barrett says further that "the deposit which causes or accompanies nodular pyorrhea is different; . . . that there is a larger percentage of phosphate and a smaller of carbonate of calcium than in ordinary deposits." But it is inferable from this that calcium carbonate is (as it is in fact) a constituent of nodular tartar, though in somewhat less amount; and we may ask, Why is it necessary to attribute the formation of carbonate of calcium in salivary tartar to the action of the carbon dioxid of the breath, and not assign a similar origin to that contained in serumal or sanguinary tartar of the nodular variety? This would not be permissible if, as Dr. Barrett states, "it (serumal tartar) is not infrequently found near the apex of the root, even where there has been no apparent great pericementitis. It is sometimes entirely isolated from the gingivæ, and small nodules may be found upon teeth in which the gingival border of the alveolus is complete, with no opening to them from the cervical margins." This, if true, is not only interesting, but sheds a flood of light upon the etiology of perhaps the most intractable form of pyorrhea alveolaris. If nodular concretions of tartar exist without pus-pockets, or even without a break in the continuity of the cervical gum-margin, how was the diagnosis made? By extraction? Then what necessitated the removal of the tooth?

The statements which I have quoted from Dr. Barrett's paper seem to me to need elaboration at greater length. Especially some fuller account is needed of the observations upon which these deductions are based, because, if they can be fully substantiated, they will, as before stated, let in a flood of light on the vexed question of the cause of pyorrhea, while, if they should be erroneous, our darkness has been further intensified.

Can we not have an expression of the views of Barrett, Black, Ingersoll, and others who have made this matter a special study?—W. L. P.

AROMATIC CHLORO-ARISTOL, for the treatment of dead and infected teeth or roots of teeth, also for alveolar abscesses with or without fistula, is the name I have given to the following combination:

Aristol, 1 drachm;
Chloroform, $\frac{1}{2}$ ounce;
Oil of cassia, 10 minims.

Owing to its gummy nature, it cannot be used with a syringe, but with a smooth broach wrapped with cotton fibers it can be very readily forced through the root-canal, after properly enlarging it.

A blind abscess at the apex of a root can thus be successfully treated, even where there is no drainage; in fact, there is no need of drainage, one or two applications being all that is needed. I have treated teeth by this method now for over ten months, and I have the first failure to find or hear of. One application is all that is needed for an infected root-canal, and I find it a capital dressing for an exposed nerve before capping it.

Where I use the preparation for abscesses, I do not use anything else; there is no need of anything further. Be sure to get it through the apex of the root. When you want to apply the treatment the second time, pack the root-canal with cotton saturated with the remedy until the next sitting, and finally fill the root with chloro-percha, using cotton fibers that are damp with

the preparation as a carrier for the chloro-percha. Should it go through the apex a little, it is better than to not quite fill to the end of the root. I shall be pleased should it prove to be as useful to my colleagues as it has been to me.

—S. CLIPPINGER, D.D.S., Toledo, Ohio.

ALCOHOLIC SOLUTIONS OF MERCURIC CHLORID.—It ought to be generally known that alcoholic solutions of mercuric chlorid are unstable. This is especially true when such solutions are exposed to light. The mercuric chlorid is changed, by the loss of chlorin, to mercurous chlorid, which falls as a precipitate. The precipitation is not prevented by ammonium chlorid or other chlorin solutions. Experiments made at the Royal Infirmary of England showed that passing chlorin through an alcoholic solution of chlorid of mercury prevented the change referred to, and that a solution so treated will keep indefinitely.—*Modern Medicine*.

THE *International Medical Magazine* states that Dr. J. Garel noticed that in putting the electric light into his own mouth with the eyes closed he experienced immediately a sensation of light in both eyes. Experimenting further with patients with empyema of one antrum of Highmore, he found that the perception of light was only in the eye above the unaffected antrum.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

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Un cas d'empyème de l'antre d'Highmore; ouverture du sinus par la méthode de Desault. *Am. de la policlin. de Bordeaux*, 1891-3, ii, 265-273.—**Guttmann** (E.) Das Füllen von Zähnen mit cauterisirter oder verjauchter Pulpa. *Cor.-Bl. f. Zahnärzte*, Berl., 1893, xxii, 117-120.—**Gysi** (A.) Ueber einige ältere und neuere Methoden, ein ausgezeichnete, reinliche Saugplatte aus Kautschuk zu erhalten, ohne Saugkammer. *Zahntech. Reform*, Berl., 1893, xiii, 40-44; 61-63.—**Halliday**. On some ways of manipulating the filling-materials. *Dental Rec.*, Lond., 1893, xiii, 193-203; [Discussion] 211-213; 250-257.—**Harlan** (A. W.) Drugs necessary or desirable to equip a dental office. *Dental Rev.*, Chicago, 1893, vii, 490-492. — Recent additions to the therapeutics of pyorrhœa alveolaris. *Ibid.*: 451-454.—**Hewitt** (A. C.) Things old, new, and useful in the operating-room. *Ibid.*: 461-473.—**Hisey** (J. W.) A case of excessive hypertrophy of the gums. *Dental Cosmos*, Phila., 1893, xxxv, 452-457.—**Holmes** (A. M.) Die Vorzüge des Hölstensteins in der zahnärztlichen Praxis. [*Transl. from: Dental Cosmos.*] *Cor.-Bl. f. Zahnärzte*, Berl., 1893, xxii, 128-131.—**Jacobs** (F. O.) The question of persistence of vitality in the pericemental membrane. *Dental Cosmos*, Phila., 1893, xxxv, 446-449.—**Jeay**. Des gingivites mercurielles d'origine thérapeutique. *Odontologie*, Par., 1893, xiii, 195-202.—**Johnstone** (T.) Amalgam. *Dental Cosmos*, Phila., 1893, xxxv, 450-452.—**Jung** (C.) Untersuchungen über die Bacterien der Zahncaries. *Cor.-Bl. f. Zahnärzte*, Berl., 1893, xxii, 109-117.—**Kells** (C. E.) jr. Management of dental practice. *Dental Cosmos*, Phila., 1893, xxxv, 428-437.—**Kennicott** (J. A.) [1824-1893.] [Obituary.] *Dental Rev.*, Chicago, 1893, vii, 521.—**Killian** (J. D.) A plea for physiology and histology. *South. Dent. J.*, Atlanta, 1893, xii, 213-217.—**Kirk** (E. C.) The question of local anesthetic nostrums. [*From: Dental Cosmos.*] *Dental Rec.*, Lond., 1893, xiii, 272-283.—**Lawrence** (Ambrose.) [1816-1893.] [Obituary.] *Dental Cosmos*, Phila., 1893, xxxv, 485.—**Lennox** (R. P.) Sui molteplici usi del metallo fusibile. [*Transl.*]**

- Gior. di corrisp. p. dentisti, Milano, 1893, xxii, 78-87.—Leplat. Instruments d'extraction nécessaires aux médecins. Quelques indications pour l'extraction des dents. Progrès dent., Par., 1893, xx, 151-153.—Loup. Nouvel émail a haute température. Odontologie, Par., 1893, xiii, 206.—Lux (H.) Die Anfertigung von Duplikatzahnersatzstücken, ohne dieselben zu modellieren. Monatschr. d. Ver. deutsch. Zahnk., Leipz., 1893, xiii, 194-197.—McReynolds (J. O.) Constitutional effects of cocaine following its local use on the nasal mucous membrane. Texas Cour.-Rec. Med., Dallas, 1892-3, x, 352.—Marshall (J. S.) De l'électricité en thérapeutique dentaire. [Transl.] Art dentaire, Par., 1893, xxxvii, 116-122.—Ripiantamento come rimedio contro l'accesso alveolare pertinace. [Transl. from: Dental Cosmos.] Gior. di corrisp. p. dentisti, Milano, 1893, xxii, 110-114.—Milligan (G. C.) [1856-1883.] [Obituary.] Ohio Dent. J., Toledo, 1893, xiii, 298.—Mitchell (L. J.) Nettoyage des dents. [Transl.] Art dentaire, Par., 1893, xxxvii, 122-125.—Murray-Aynsley (J. H.) Decay of teeth in New Zealand. N. Zealand M. J., Dunedin, 1893, vi, 97-112.—Neall (E. H.) Vorstehen des Unterkiefers. [Transl. from: Dental Cosmos.] Cor.-Bl. f. Zahnärzte, Berl., 1893, xxii, 158-161.—Patrick (J. J. R.) The effect of eruptive diseases on the teeth. Dental Rev., Chicago, 1893, vii, 439-446.—Peabody (F.) The conservative treatment of teeth by gold process. South. Dent. J., Atlanta, 1893, xii, 208-213.—Price (W. A.) Treatment of the congenital deformity of cleft palate. Dental Reg., Cincin., 1893, xlvii, 261-269.—Professional (The) status of dentistry. [Edit.] Dental Cosmos, Phila., 1893, xxxv, 478-480.—Rohland (C. B.) Conservatism in crown- and bridge-work. Dental Rev., Chicago, 1893, vii, 455-461.—Roughton (E. W.) Lantern demonstration on the bacteria of the mouth. Brit. J. Dent. Sc., Lond., 1893, xxxvi, 481-489.—Rucker (H. N.) Double fracture of lower jaw with long delayed union. Pacific M. J., San Fran., 1893, xxxvi, 337-340.—Rymer (J. F.) Lavori a corona e a ponte. [Transl.] Gior. di corrisp. p. dentisti, Milano, 1893, xxii, 88-97.—Salzer (B.) Einige Worte über Narkose im Dienste der Zahnheilkunde. Pest. med.-chir. Presse, Budapest, 1893, xxix, 519-522.—Also: J. f. Zahnk., Berl., 1892-3, vii, 367.—Sauvez (E.) Le bromure d'éthyle comme anesthésique général. Odontologie, Par., 1893, xiii, 193-195.—Schiffmann (E.) On the treatment of dead and infected teeth with potassium and sodium (Schreier's preparation.) [Transl.] Dental Cosmos, Phila., 1893, xxxv, 463-465.—Scholefield (P. M.) Treatment of irregularities. Brit. J. Dent. Sc., Lond., 1893, xxxvi, 490-495.—Schreier (E.) Ein neues, auf chemischer Zersetzung beruhendes Verfahren, den jauchigen Inhalt von Wurzelcanälen unschädlich zu machen. J. f. Zahnk., Berl., 1892-3, vii, 351.—Die Behandlung gangränöser Pulpen mit Kalium-Natrium. *Ibid.*: 351; 359.—Zur Aetiologie und Pathogenese der Periostitis dentalis. *Ibid.*: 376.—Sherman (W. B.) Ein neues Mittel zur Mundhöhlenbeleuchtung. [Transl. from: Dental Cosmos.] *Ibid.*: 379.—Staphylophoraphie. Art dentaire, Par., 1893, xxxvii, 111-114.—Thomas (J. D.) The anesthetic zone in nitrous-oxid anesthesia. Dental Cosmos, Phila., 1893, xxxv, 442-446.—Torger (O.) Meine Erfolge in der antiseptischen Behandlung der Wurzelcanäle und Wurzelfüllungen. Cor.-Bl. f. Zahnärzte, Berl., 1893, xxii, 97-109.—Trennung (Die) von Zahnheilkunde und Technik. Zahntech. Reform, Berl., 1893, xiii, 35-39.—Waite (J. E.) Anesthesia, and the use of a new ether-inhaler. Internat. Dent. J., N. Y. & Phila., 1893, xiv, 401-406.—Wertheimer. De l'action vaso-motrice de la strychnine sur la muqueuse bucco-linguale. Rev. odont., Par., 1893, xii, 250.—Westlake (A.) Correction of deformities of the oral region. Internat. Dent. J., N. Y. & Phila., 1893, xiv, 416-419, 1 pl. [Discussion] 424-427.—Williamson (William.) [1817-1893.] [Obituary.] Dental Rec., Lond., 1893, xiii, 284.—Zahnärztliche Hilfe bei der Armee. J. f. Zahnk., Berl., 1892-3, vii, 360.

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE, 1893.

- June 6.—No. 499,015, to JAMES H. DOWNIE. Dental furnace.
 June 13.—No. 499,602, to GEORGE B. SNOW. Dental vulcanizer.
 " "—No. 499,612, to DANIEL W. TOWER. Tooth-brush.
 " "—No. 499,632, to JOHN H. HEIVLY. Pneumatic dental plugger.
 June 20.—No. 500,103, to DANIEL A. NASH. Dental chair.
 June 27.—No. 500,139, to ROSWELL DE L. KING. Dental engine.

THE DENTAL COSMOS.

VOL. XXXV. PHILADELPHIA, SEPTEMBER, 1893.

No. 9.

THE WORLD'S COLUMBIAN DENTAL CONGRESS.

THE thought which more than six years ago began to make itself felt among the dentists of America, and which continued to grow, until it took material shape in an organized effort looking to the holding of a World's Congress of Dentists during the Columbian year, has passed beyond the formative stage, and the World's Columbian Dental Congress, as to-day organized, is launched into existence an accomplished fact.

The history of this movement is in some respects the counterpart of that of all far-reaching conceptions which come to a successful issue. It has come into being through an evolutionary process from small beginnings whose antecedents are traceable to no specific mind-point, but which start far back in the dimly conscious stage, and gradually develop, gathering force by the accretion of many and varied ideas, until the expression of the composite thought is reached, and its harmonious realization is achieved.

The feeling that a congress of dentists from all nations of the world should be held, was recognizable early in the last decade. Sporadic efforts were made in that direction, but they failed of support. The soil was not prepared for the seed; time was needed for the suggestion to come to fruition in the minds of those who were to give it tangible shape. The first organized effort to give expression to the idea, whose consummation is to-day presented to the world, was the resolution passed by the New Jersey State Dental Society, at its meeting in Montclair, N. J., on January 11, 1890, as follows:

"Deeming it fitting, and the proper time for holding an International Dental Congress in the year 1892, the New Jersey State Dental Society has appointed a committee to act in co-operation with like committees from

other dental societies throughout the United States. They would request your society to appoint a committee to meet with them at the Hoffman House, New York, on Tuesday afternoon, April 8, to formulate plans for the holding of the First International Dental Congress."

In pursuance of this resolution the call was issued, and a number of States responded by sending delegates, resulting in a large meeting, whose deliberations brought out a resolution to refer the question of holding a dental congress to the American and Southern Dental Associations at their next meetings. When the Southern Dental Association met at Atlanta, Georgia, in July, 1890, Dr. L. D. Carpenter introduced the following resolution :

"Whereas, There is to be a World's Columbian Exposition in Chicago in 1893; and

"Whereas, In consequence of the fact that the choicest products of the world are to be there displayed, it is expected that citizens in large numbers of all civilized countries will be gathered together there for the purpose of seeing these exhibits; and

"Whereas, It is to be presumed that many dentists from foreign countries will visit the United States at that time; and

"Whereas, The time of the Exposition will be an opportune occasion for a meeting of the dentists of the world; and

"Whereas, It is believed that a great advance in science and the practice of dental and oral surgery would result from a meeting of the dentists of the United States with those from foreign countries who then might be visiting the country; and

"Whereas, It is desirable that any meeting then held should be at the instance of the American Dental Association and the Southern Dental Association, and organized by a joint committee by them appointed; therefore, be it

"Resolved, That the president of this association appoint a committee of five to confer with a like committee that may be appointed at the next meeting of the American Dental Association, upon this subject, and that this joint committee shall have power to fill all vacancies and shall add to its membership either one, two, three, or five more members, as it may deem advisable; and when this committee is so completed it shall be clothed with full power to take such action as in its judgment it may deem best for creating an organization for the purpose of holding a Dental Congress in Chicago in 1893, which the reputable dentists throughout the world shall be invited to attend; and that any action that this committee may take in the premises shall be final and binding."

L. D. Carpenter, Atlanta, Ga.; J. Y. Crawford, Nashville, Tenn.; W. J. Barton, Paris, Tex.; J. Taft, Cincinnati, O.; C. S. Stockton, Newark, N. J.; were appointed on behalf of the Southern Dental Association, and L. D. Shepard, Boston, Mass.; W. W. Walker, New York City; A. O. Hunt, Iowa City, Iowa; H. B. Noble, Washington, D. C.; Geo. W. McElhaney, Columbus, Ga.; were appointed by the American Dental Association at its meeting at Excelsior Springs,

Missouri, in August of the same year (1890) for the same purpose. The two committees, in joint session, at once increased their number by including John C. Storey, Dallas, Tex.; M. W. Foster, Baltimore, Md.; John S. Marshall, Chicago, Ill.; H. J. McKellops, St. Louis, Mo.; and A. W. Harlan, Chicago, Ill.

The appointment of the Executive Committee as thus constituted at once placed the movement on a firm foundation and assured its success. Opposition to the idea of holding a world's congress of dentists, which had successfully defeated all previous efforts, arose either from a misunderstanding of the animating motive of its promoters or from that portion of the profession who, holding to the axiom that "dentistry is a specialty of medicine," were antagonistic to any plan which favored any international dental congress other than as an integral part of a regularly constituted medical congress of international character. An unlooked-for inspiration and renewed impetus was given to the movement, however, by the creation of the World's Congress Auxiliary through the wisdom and far-sighted policy of the directory of the World's Columbian Exposition; though the committee on a World's Dental Congress created by the concurrent action of the two governing dental associations of America had already largely perfected its plan of organization and was carrying out the preliminary details.

The plan and scope of the World's Congress Auxiliary was so manifestly in harmony with the aims and spirit of the committee having the Dental Congress in charge that, after consultation with President Charles C. Bonney of the Auxiliary, it was decided to hold the meeting under its auspices and as one of the hundred or more congresses which, under the same management and the same guiding motive, were collectively to set forth the existing status of the world's intellectual progress at the time of the World's Columbian Exposition. The wisdom of this alliance at once became apparent. The World's Columbian Dental Congress was officially rechristened to harmonize its title with its prototypes of the Auxiliary; but what was of greatest importance, the Dental Congress received renewed vigor and dignity by the ratification of its birthright through the official indorsement derived from its alliance which it formed with the Auxiliary.

The resolutions creating the Dental Congress were carefully drawn, the lines upon which it was projected were lifted beyond the limits of creed and sectarianism, those who were its projectors manifested their clear conception of the universal, world-wide element which should characterize a world's congress, and the spirit of their work was inclusive, not exclusive. No qualification for membership

was demanded other than that of reputability as legal dental practitioners.

Under the new régime the work of organization proceeded rapidly. Twenty-five committees were appointed by the General Executive Committee for carrying out the work, which included every department of dental science and art, with much that was collateral to it. Election of the permanent officers followed, and the entire machinery of the organization was set in motion.

In its fundamental plan the World's Columbian Dental Congress is *sui generis*: it is a congress of dentists and for dentists, universal in scope. No such organization has heretofore existed, and no such opportunity has ever been afforded for the discussion of those questions which are of vital importance to our autonomy as a profession. The opportunity should not be lost nor ignored. We cannot by formal resolution fix our status among the professions, but we can, after careful deliberation and comparison of opinions, define our attitude in this relation. We can and should carefully consider the factors which contribute to the education and training of the dental student, not upon narrow sectional lines, but, after a comparison of the views of dental educators from all countries, at least establish the basis upon which an improved curriculum for the dental student may be built, whereby the graduate under such a system shall be accorded unquestioned recognition elsewhere than within the territorial limits of his own State.

The ethical standards of dentistry need clearer definition. Our profession has outgrown its swaddling clothes. It has become so strongly individualized, that the ethical formulas which it derived from those suited to the practitioner of medicine are insufficient. As much of the old as is valuable should be retained and reasserted, but the need for a restatement of our code, more in harmony with the present conditions, is evident. Scientific dentistry in its latest phases and the newest practical developments in our art, will receive attention, but the present occasion demands something besides this. The Congress will not have achieved a full success if the vital questions affecting dental polity are not definitely considered. The work of the organization has been stupendous, the responsibility equally great, but those who have devoted time and energy to it will find their full measure of reward in contemplating the success of their effort, and the lasting benefit which it will confer upon our profession and humanity.

THE RECEPTION BY THE CHICAGO DENTAL PROFESSION.

THE dental profession of Chicago entertained visiting dentists at a reception on Saturday evening, August 12th. The invitation was issued by the associated dental societies of Chicago, as follows:

"The Chicago Dental Society, The Chicago Dental Club, The Odontological Society of Chicago, The Odontographic Society, The Atkinsonian Dental Society and The Hadyn Dental Society, invite you to attend a Reception in honor of the Officers and Members of the World's Columbian Dental Congress, The American Dental Association, The Southern Dental Association, The National Association of Dental Faculties and The Delta Sigma Delta Fraternity, on Saturday evening, August twelfth, Eighteen hundred and ninety three, from eight until eleven o'clock.

"Kinsley's."

On the reception committee Drs. J. W. Wassall and L. L. Davis represented the Chicago Dental Society, Dr. E. L. Clifford the Chicago Dental Club, Drs. W. B. Ames and Edmund Noyes the Odontological Society, Drs. R. B. Tuller and U. G. Poyer the Odontographic Society, Drs. M. B. Rimes and Louis Ottofy the Hadyn Dental Society, Dr. P. J. Kester the Atkinsonian Dental Society, and Dr. F. H. Gardiner the Columbia Dental Club. About five hundred were present, including many ladies.

The reception was held in the large ball room on the fourth floor of Kinsley's famous establishment. Music was furnished by a mandolin orchestra, concealed in the curtained balcony. Light refreshments were served during the evening. The gathering was a notable one on account of the large number present, especially the foreign contingent, among whom were representatives from many different countries. The occasion was not only a brilliant one, but particularly happy in that it afforded an opportunity for the meeting of friends and acquaintances who had not met since their college days.

The event was a fitting and enjoyable prelude in a social way to the more serious and active work to follow.

INTERNATIONAL MEDICAL CONGRESS.

THE International Medical Congress, which was to have met in Rome, on the 24th of September, it is officially announced, is postponed until April, 1894.

TOPICS SELECTED FOR DISCUSSION BY THE CONGRESS

THE following questions were selected for discussion before the Sections or the whole Congress, at times otherwise unoccupied :

1. What shall the educational curriculum include in order to best fit the dentist for his duties ?
2. What relation shall dentistry hold to medicine ?
3. To what extent should manual training (technics) be made an obligatory part of the curriculum ?
4. Can apical pericementitis occur in connection with roots which have been perfectly sterilized and filled ; and if so, under what circumstances ?
5. Is there any means for certainly diagnosing calcific deposits in the pulp-tissue ?
6. To what extent is erosion of the teeth an expression of systemic disturbance ?
7. What are the etiological factors in the production of (*a*), the *protruded* lower jaw, (*b*) the *retracted* lower jaw ? When this form of irregularity is corrected by "jumping the bite," does a compensating adjustment take place in the temporo-maxillary articulation ?
8. What improvements should be made in the terminology of the group of diseases variously known as Pyorrhea Alveolaris, Riggs's Disease, Loculosis, Phagedenic and Calcic Pericementitis, Pocket Disease of the Alveolus, etc., to more accurately express the conditions ?
9. What grounds are there for a belief in the existence of the so-called "enamel reticulum ?"
10. What substances ordinarily present in the mouth, exert the greatest solvent action upon tooth-structure and cement fillings ?
11. To what extent is interrupted primary dentition an etiological factor in the diseases incident thereto, more especially pulmonary, digestive, and intestinal disorders ?
12. To what extent is the so-called incompatibility of filling-materials with tooth-structure a factor in the dissolution of cavity margins ?
13. What special conditions arising from acute pericementitis demand surgical interference, including extraction ?
14. What neoplasms, both as to kind and degree, necessitate the excision of the inferior maxilla in whole or part when associated with that bone ?
15. Is mercuric chlorid (sublimite) a suitable sterilizing agent for the infected dentine of pulpless teeth ? Can it be efficiently used without staining the tooth-structure through the formation of mercuric sulphid by reaction with the putrescent contents of the tubuli ?

NOT THINGS, BUT MEN.

THE WORLD'S CONGRESS AUXILIARY

OF THE WORLD'S COLUMBIAN EXPOSITION

OF 1893.

NOT MATTER, BUT MIND.

PRESIDENT, CHARLES C. BONNEY.

VICE-PRESIDENT, THOS. B. BRYAN.

TREASURER, LYMAN J. GAGE

SECRETARIES, BENJAMIN BUTTERWORTH, CLARENCE E. YOUNG.

THE WOMAN'S BRANCH OF THE AUXILIARY:

PRESIDENT, MRS. POTTER PALMER.

VICE-PRES'T, MRS. CHARLES HENROTIN.

PROGRAM

OF

THE WORLD'S COLUMBIAN DENTAL CONGRESS

TO BE HELD IN THE

MEMORIAL ART PALACE,

MICHIGAN AVENUE.....

FOOT OF ADAMS STREET.

.....CHICAGO.

AUGUST 14-19, 1893.

OFFICERS OF THE CONGRESS.

President.—Dr. L. D. Shepard.

Vice-Presidents.—Dr. W. W. H. Thackston, Dr. W. H. Morgan, Dr. A. L. Northrop, Dr. J. Taft, Dr. Louis W. Lyon, Dr. W. O. Kulp, Dr. C. S. Stockton, Dr. E. T. Darby, Dr. H. J. McKellops, Dr. J. H. Hatch, Dr. J. B. Patrick, Dr. John C. Storey.

Secretary-General.—Dr. A. W. Harlan.

Assistant Secretaries.—Dr. Joseph Bauer, Dr. Ralph Dillon, Dr. Louis Ottofy, Dr. W. C. Wardlaw.

Treasurer.—Dr. J. S. Marshall.

GENERAL EXECUTIVE COMMITTEE.

Dr. W. W. Walker, Chairman; Dr. A. O. Hunt, Secretary; Dr. J. S. Marshall, Treasurer.

Dr. W. J. Barton, Dr. L. D. Carpenter, Dr. J. Y. Crawford, Dr. M. W. Foster, Dr. A. W. Harlan, Dr. H. J. McKellops, Dr. G. W. McElhaney, Dr. H. B. Noble, Dr. John C. Storey, Dr. C. S. Stockton, Dr. L. D. Shepard, Dr. J. Taft.

GENERAL COMMITTEE OF THE WORLD'S CONGRESS AUXILIARY.

Chairman.—Dr. J. S. Marshall.

Vice-Chairman.—Dr. A. W. Harlan.

Dr. G. V. Black, Dr. C. N. Johnson, Dr. Geo. H. Cushing, Dr. N. Nelson, Dr. A. E. Baldwin, Dr. A. W. Freeman, Dr. E. S. Talbot, Dr. Geo. A. Christman.

COMMITTEE OF THE WOMAN'S BRANCH.

Chairman.—Dr. Hattie E. Lawrence.

Dr. Marie T. Bacon, Dr. Emma Beanham, Dr. Louise Peterson, Dr. Rebecca H. McIntosh.

GENERAL PROGRAM.

MONDAY, AUGUST 14.

Opening Session.

Hall of Washington, 10 A.M.

Opening Address by President, Hon. C. C. Bonney, of the World's Congress Auxiliary.

Presentation of the Officers of the Congress, by the Chairman of the General Executive Committee, W. W. Walker, D.D.S., New York.

Reading of the Resolutions Creating the Congress, by the Secretary-General, A. W. Harlan, M.D., D.D.S., Chicago, Ill.

Address of Welcome, Hon. John Temple Graves, of Georgia.

Address of the President of the World's Columbian Dental Congress, L. D. Shepard, A.M., D.D.S., D.M.D., Boston, Mass.

Reception of Foreign Representatives.

Responses by Representatives of Foreign Countries.

Announcement of Sections and Their Places of Meeting.

Adjournment.

The Congress will sit in general session daily in the Hall of Washington, commencing at 12 o'clock.

The Sections will meet daily at 2.30 P.M., in the halls on the second floor, south wing, as follows: Section I, Hall XX; Section II, Hall XXVII; Section III, Hall XXVIII; Section IV, Hall XXIX; Section V, Hall XXX:

Section VI, Hall XXXI; Section VII, Hall XXXIII; Section VIII, Hall XXXII.

The detailed program of the Section meetings will be announced by the Chair at the close of each session.

The following papers will be read before the whole Congress:

"Concerning Various Methods Advocated for Obviating the Necessity of Extracting Devitalized Tooth-Pulps." W. D. Miller, Ph.D., M.D., D.D.S., Berlin, Germany.

"English Tube-Teeth; Their Uses in Plate, Crown and Bridge-Work." Illustrated by specimens and diagrams. John Girdwood, L.D.S. Edin., D.D.S., Edinburgh, Scotland.

"Among the Ancient Hawaiians." Illustrated by diagrams and crania of ancient Hawaiians. J. M. Whitney, M.D., D.D.S., Honolulu, H. I.

"On Congenital Defects of the Enamel." (Illustrated.) Otto Zsigmondy, M.D., Vienna, Austria.

"Hypnotic Suggestion as an Obtundent and Sedative." Thomas Fillebrown, M.D., D.M.D., Boston, Mass.

PAPERS TO BE READ BEFORE THE DIFFERENT SECTIONS.

SECTION I.

Anatomy and Histology.

Chairman.—R. R. Andrews, A.M., D.D.S., Cambridge, Mass.

"What has Dentistry to Demonstrate against the Hypothesis of Organic Evolution?" (Illustrated.) W. G. A. Bonwill, D.D.S., Philadelphia, Pa.

"The Pedigree of the Central Incisor." Alton H. Thompson, D.D.S., Topeka, Kan.

"The Teeth and Hair; Their Homology and Pathological Intimacy." S. H. Guilford, A.M., D.D.S., Ph.D., Philadelphia, Pa.

"Teeth of the Lower Jaw at Birth." (Illustrated.) Frank Abbott, M.D., New York.

SECTION 2.

Etiology, Pathology, and Bacteriology.

Chairman—G. V. Black, M.D., D.D.S., Jacksonville, Ill.

"Adenoid Growths and Other Diseases Incident to Primary Dentition." Annie Felton Reynolds, D.D.S., Boston, Mass.

"Pulpitis Chronica Idiopathica." P. Macarovici, M.D., Jassy, Roumania.

"The Relation of Predisposing Causes (so called) to the Active Causes of Dental Decay." L. C. Ingersoll, A.M., D.D.S., Keokuk, Iowa.

"Oral Pathology." R. Finley Hunt, D.D.S., Washington, D.C.

"Pathological Conditions of the Air-Cavities of the Cranium resulting from Dental Lesion." I. P. Wilson, D.D.S., Burlington, Iowa.

SECTION 3.

Chemistry and Metallurgy.

Chairman.—D. R. Stubblefield, A.M., M.D., D.D.S., Nashville, Tenn.

"The Study of Chemistry in Dentistry." E.W. Rockwood, A.M., Iowa City, Iowa.

"Oxyphosphates." W. B. Ames, D.D.S., Chicago, Ill.

SECTION 4.

Therapeutics and Materia Medica.

Chairman.—F. J. S. Gorgas, A.M., M.D., D.D.S., Baltimore, Md.

"Method of Inducing Local Anesthesia by Cocain." D. Caracatsanis, M.D., Athens, Greece.

"Treatment of Alveolar Pyorrhea." D. Caracatsanis, M.D., Athens, Greece.

"Cocain Injections for the Production of Local Anesthesia." Anthony Bleichsteiner, M.D., Graz, Austria.

"On the Treatment of Dental Caries in the Second, Third, and Fourth Degrees." D. Caracatsanis, M.D., Athens, Greece.

"Chlorid of Ethyl as an Anesthetic." Hedwig Bensow Stahlberg, Helsingfors, Finland.

"Obtunding the Sensibility of the Dentine." W.C.Davis, B.S., D.D.S., Lincoln, Neb.

"A New Apparatus for Maintaining Anesthesia without a Face-piece, and with the Mouth Open." Thomas Fillebrown, M.D., D.M.D., Boston.

SECTION 5.

Dental and Oral Surgery.

Chairman.—Truman W. Brophy, M.D., D.D.S., Chicago, Ill.

"The Surgical Engine and Its Uses." M. H. Cryer, M.D., D.D.S., Philadelphia, Pa.

"Surgical Treatment of Palatal Defects." Truman W. Brophy, M.D., D.D.S., Chicago, Ill.

"History and the Present Status of the Transplantation of Dental Tissues." Louis Ottogy, D.D.S., Chicago, Ill.

SECTION 6.

Operative Dentistry.

Chairman.—Wm. Jarvie, M.D.S., Brooklyn, N. Y.

"Tin Foil for Filling Teeth." H. L. Ambler, D.D.S., M.D., Cleveland, O.

"Amalgam as a Restorer in Extensive Loss of Coronal Surfaces." George W. Whitefield, M.D., D.D.S., Evanston, Ill.

"The Treatment of Infected Root-Canals with Kalium-Natrium." Dr. Emil Schreier, Vienna, Austria.

SECTION 7.

Prosthesis and Orthodontia.

Chairman.—C. L. Goddard, A.M., D.D.S., San Francisco, Cal.

"On the Possibility of Avoiding Metallic Clasps in Partial Dentures of Vulcanite." D. Caracatsanis, M.D., Athens, Greece.

"A Method of Constructing Spring Appliances for Correcting Irregularities of the Teeth." Illustrated with original charts and models. V. H. Jackson, M.D., D.D.S., New York.

"A Method of Fusing Porcelain Facing to Backing and Cap." C. G. Meyers, D.D.S., Galveston, Tex.

"Separation of the Superior Maxilla at the Symphysis." C. L. Goddard A.M., D.D.S., San Francisco, Cal.

"Some Principles governing the Development of Facial Contours in the Practice of Orthodontia." Calvin S. Case, M.D., D.D.S., Chicago, Ill.

"Prudence and Gutta-Percha in Crown and Bridge-Work." George V. I. Brown, D.D.S., Duluth, Minn.

"The Immediate Method of Treatment of Irregularities." Illustrated by lantern. Geo. Cunningham, M.A., D.M.D., L.D.S. Eng., Cambridge, England.

SECTION 8.

Education, Legislation, and Literature.

Chairman.—J. J. R. Patrick, D.D.S., Belleville, Ill.

"On the Status of the Art of Dentistry and of Dentists in Roumania." P. Macarovici, M.D., Jassy, Roumania.

"Nomenclature relating to Forms of the Dental Arch and Special Positions of the Teeth." Garrett Newkirk, M.D., Chicago, Ill.

"The Editorial Function in Dental Journalism." Frank W. Sage, D.D.S., Cincinnati, O.

"Dental Legislation." H. B. Noble, D.D.S., Washington, D. C.

"Dentistry in Norway, and the Use of Cocain as a Local Anesthetic." Miss Martine Magnus, Christiansand, Norway.

"Operative Technics." D. M. Cattell, D.D.S., Chicago, Ill.

REPORTS OF COMMITTEES.

The time and place for reading these Reports will be announced by the President.

Committee on the History of Dental Legislation in this and other countries. Wm. Carr, M.D., D.D.S., New York, Chairman.

Committee on the History of Dentistry in the United States. J. Taft, M.D., D.D.S., Cincinnati, O., Chairman.

Committee on Nomenclature. G. V. Black, M.D., D.D.S., Jacksonville, Ill., Chairman.

Committee to promote the appointment of Dental Surgeons in the Armies and Navies of the World. M. W. Foster, M.D., D.D.S., Baltimore Md., Chairman.

Committee on the Care of the Teeth of the Poor. T. H. Parramore, D.D.S., Hampton, Va., Chairman.

Committee on Biology and Bacteriology. R. R. Andrews, A.M., D.D.S., Cambridge, Mass., Chairman.

PRIZE ESSAY.

Committee on Prize Essays—Dental Hygiene. Theo. Stanley, M.D., D.D.S., Kansas City, Mo., Chairman.

LANTERN EXHIBITS IN DENTAL HISTOLOGY AND BACTERIOLOGY.

Two evenings will be devoted to Lantern Demonstrations in these Departments. Announcements of the time and details of the Exhibits will be made by the President, in connection with the announcements of the Section work.

CLINICS AND PRACTICAL DEMONSTRATIONS.

The time from 9 to 11.30 A.M., daily, beginning Tuesday, has been set apart for Clinics and Practical Demonstrations, which will be held in rooms provided for that purpose at 102 Michigan Avenue, cor. Michigan Avenue and Randolph Street. Take elevator. Details of the Clinics will be announced in a special program.

WORLD'S COLUMBIAN DENTAL CONGRESS.

THE World's Columbian Dental Congress convened at the Hall of Washington in the Memorial Art Palace, Chicago, Monday, August 14, 1893. The dental profession of every quarter of the globe had sent its representative men to join in commemorating the progress accomplished in the science and art to which their lives were consecrated. Men were present from every nation and every clime. From far-off Australia, from the Mikado's Empire, from the Pearl of the Pacific, practitioners of dentistry have journeyed to greet their brethren of Europe and the two Americas. The international character of the gathering was illustrated by the number of the representatives from foreign lands, while responses to the greetings extended were eloquent of the fraternal feeling which actuated every man present. It is safe to say also that every man who attended will return to his home better fitted for practice.

FIRST DAY—GENERAL SESSION.

The session was called to order by Dr. W. W. Walker, chairman of the Executive Committee, who introduced Hon. C. C. Bonney, president of the World's Congress Auxiliary.

Dr. J. Taft invoked the divine blessing upon the deliberations of the Congress.

President Bonney delivered the following address:

OFFICERS AND MEMBERS OF THE WORLD'S COLUMBIAN DENTAL CONGRESS, LADIES AND GENTLEMEN:

The science and practice of the art of dentistry most conspicuously represents one of the most important movements of the age—the specialization of scientific pursuits. The old fields of research and application were so narrow that they were readily mastered by the learner and practitioner, who scarcely realized indeed the importance and the magnitude of the different branches to which, as occasion required, he turned his half-trained hand. All this has been changed by the marvelous development of modern civilization. The horizon of scientific attainment has been lifted and extended, until only a powerful glass can trace its outlines. In the swiftly developing evolution of arts and sciences, the great work of logical and orderly differentiation has gone forward, subdividing the professional and other pursuits, until now he who would command the confidence of his brethren and the public must have more than a general knowledge of the department in which he is engaged. That, indeed, is indispensable, but it is not enough. The general physician and surgeon cannot be trusted to deal with the exact mechanism of the eye or ear, or with the important and

delicate relations of the teeth. A lifetime may be spent and the highest abilities and attainments be exercised in their field. The old-fashioned tooth-carpenter, with his entirely appropriate name, has like the Dodo become an extinct species, and in his place we find the modern doctor of dental surgery, accomplished, learned, and skilled, familiar with anatomy, histology, etiology, pathology and bacteriology, chemistry and metallurgy, as well as with the practical operations of the art.

In welcoming you to this Congress, I congratulate you upon the admirable program by the committee of organization, and upon the international character of the papers to be presented. Germany, Austria, Scotland, Armenia, Greece, Finland, Norway, England, and other countries unite with the American States in this Congress. May it realize your past expectations, and be fruitful of the most satisfactory results. The realization of this organization by which this Congress has been constituted are represented on this occasion by Dr. W. W. Walker, the chairman, who will now be presented to you as representing not only this general committee, but the Committee of the World's Congress Auxiliary, with whose co-operation the Congress has been constituted. I have the pleasure of presenting to you Dr. Walker.

Dr. W. W. Walker then spoke as follows :

PRESIDENT BONNEY, AND OFFICERS AND MEMBERS OF THE WORLD'S COLUMBIAN DENTAL CONGRESS; LADIES AND GENTLEMEN :

After the very flattering remarks and most cordial welcome of our esteemed friend, the president of the World's Congress Auxiliary, the Hon. C. C. Bonney, it is hardly necessary for me at this time to recapitulate that which has so often been placed before the reputable dentists of the world by this Executive Committee in circular letters, through the dental journals and other dental literature, as to how the World's Columbian Dental Congress was born and organized. Suffice it to say it was the joint resolution of the two foremost societies of America, the Southern Dental Association and the American Dental Association, that this Executive Committee of fifteen should organize a Dental Congress in this city at this time, and that their action should be final.

The Executive Committee have done only that which we considered our duty. We have laid aside all personal feeling, if any ever existed; we have been working hand in hand and shoulder to shoulder to accomplish for our chosen profession that which places it where it should so justly and truly be placed, in the front rank of scientific professions of the world.

In the performance of that duty, many obstacles have arisen, but "there is no such word as fail" in our vocabulary, and with the assistance of those who have worked with us the result has been accomplished.

As a recompense for the work we have done, all we ask is that the members of the two organizations and the members of this World's Columbian Congress, after it is over, will say, "Well done, good and faithful servants."

I now have the honor of introducing to you the president of the World's Columbian Dental Congress, Dr. L. D. Shepard, of Boston, Mass.

President SHEPARD: No extended words are expected from me at this time. I will now call upon Dr. Walker to proceed with the introduction of the other officers of the Congress.

Dr. Walker then introduced the remaining officers of the World's Columbian Dental Congress: Vice-Presidents, Dr. W. W. H. Thackston, of Farmville, Va.; Dr. W. H. Morgan, of Nashville, Tenn.; Dr. A. L. Northrop, of New York City; Dr. J. Taft, of Cincinnati, O.; Dr. Louis W. Lyon, of St. Paul, Minn.; Dr. W. O. Kulp, of Davenport, Ia.; Dr. C. S. Stockton, of Newark, N. J.; Dr. E. T. Darby, of Philadelphia, Pa.; Dr. H. J. McKellops, of St. Louis, Mo.; Dr. J. H. Hatch, of San Francisco, Cal.; Dr. J. B. Patrick, of Charleston, S. C.; Dr. John C. Storey, of Dallas, Texas; the secretary-general of the Congress, Dr. A. W. Harlan, of Chicago; the assistant secretaries, Drs. Joseph Bauer, of New Orleans, Ralph Dillon, Louis Ottofy, of Chicago, and W. C. Wardlaw; and the treasurer, Dr. J. S. Marshall, of Chicago, and the secretary of the General Executive Committee, Dr. A. O. Hunt, of Iowa City, Iowa.

Dr. Walker then formally introduced the members of the Executive Committee, and of the General Committee of the World's Congress Auxiliary, and also the Committee of the Women's Branch, by name.

The resolutions creating the Congress were then read by the secretary-general, Dr. Harlan, as published in the DENTAL COSMOS, current issue, page 674.

ADDRESS OF WELCOME.

BY DR. J. Y. CRAWFORD, OF NASHVILLE, TENN.

(Owing to the inability of Hon. John Temple Graves, of Georgia, to be present to deliver this address of welcome, Dr. J. Y. Crawford consented at a few minutes' notice to welcome the foreign representatives.)

PRESIDENT BONNEY, OF THE WORLD'S AUXILIARY CONGRESS, MR.
PRESIDENT OF THE WORLD'S COLUMBIAN DENTAL CONGRESS,
LADIES AND GENTLEMEN:

You will excuse me for saying that I am very much embarrassed at being called upon at this late hour to make the address of welcome, in the room and in the stead of the distinguished scholar and orator from Georgia, Hon. John Temple Graves. I am further embarrassed from the fact that I am to stand here as the mouth-piece not only of the dental profession of the United States, but as the mouth-piece of the whole people composing the American Union. Quite seventy million of hearts to-day are expressing through me their universal welcome to the dentists of the world! How sublime a thought it is that America is now extending through me this hearty welcome and saying to you, "Be with us and among us, and assist us in furthering the grand work of the dental profession!" I am additionally embarrassed from the fact that I welcome you here to-day for the purpose of discussing the advancing of the munificent art of dentistry, as it is to-day a question of paramount importance to all other questions. I am sorry that Mr. Graves is not here to discuss the question of dentistry from the standpoint of public necessity. Why do I say that? Because of all other questions in the world, that address themselves to the civilization of the nineteenth century, the question of dental surgery stands at the head of the list. Why? Because all other departments of learning and advancement have received more assistance and attention than the dental profession, and because it is not yet a universally recognized fact that the human family needs the good offices and attention of the dentist as they need their doctor, as they need their preachers, as they need their teachers and their lawyers.

It is becoming in America to open wide her gates and extend a welcome to the dental world, because she leads in that vocation. We are here for the purpose of furthering the grand work of our profession, until this the civilization of the present age shall be touched and benefitted to that extent that will tend to the increase of the average length of human life, and perhaps be a potent factor in the perpetuation of the most remarkable civilization in the world's history.

Now to the gentlemen from foreign countries, it is my pleasure as well as my duty to extend to you a most cordial welcome; and in calling your attention to the ensign of the republic, the Stars and Stripes, I wish to say that banner is not only an insignia of political and religious liberty, but its most beautiful signification is the gracious hospitality we extend to you to-day; all of this, and

more if we had it, would be freely offered to you on this notable occasion in the history of odontological investigation.

In conclusion, allow me to ask you to grasp my hand in your imagination, and feel the pulsation of the great heart of the American people, beating in unison at this very moment; and while I stand in this attitude allow me to say that it thrills my very soul as the united sentiment of this great nation passes from me to you, when extending this form of welcome.

Letters regretting their inability to attend the sessions of the Congress on account of illness were read by the secretary-general, from Drs. W. W. H. Thackston, Farmville, Va., and W. H. Morgan, Nashville, Tenn., two of the vice-presidents.

President Shepard then called Vice-President A. L. Northrop to the chair, and delivered his address, as follows:

INAUGURAL ADDRESS.

BY L. D. SHEPARD, A.M., D.D.S., D.M.D.

(President of the World's Columbian Dental Congress.)

It is becoming that the gathering of the nations in this wonderfully energetic metropolis, in this memorable year for America, should be taken advantage of for the holding of an Exposition of Dentistry, of all countries, in all branches, scientific and practical, as it exists to-day.

The origin of the Congress dates from action taken three years ago by the two governing dental societies of the country—action which anticipated, I believe, the organization of the World's Congress Auxiliary with its high aims and broad plans. We were happy to ally ourselves with the Auxiliary, and so participate in the successful administration of its high educational result. While our autonomy has been preserved, we are proud to be one of the many Congresses held under its auspices for the good of society.

The two societies jointly created a trust, by the appointment of a General Executive Committee, and agreed "that any action that this committee may take shall be final and binding."

The only instruction to the committee in what might be called its charter was "to take such action as in its judgment it may deem best for creating an organization for the purpose of holding a dental meeting in Chicago in 1893, which the reputable dentists throughout the world shall be invited to attend."

It was understood that this organization should be *sui generis*, complete in itself without continued corporate existence. The committee accepted the trust as a great and responsible one, and has worked assiduously to justify the confidence reposed in it. It has ever endeavored to do the best thing and to be just to all.

The committee understood that the primal and fundamental object was to hold a dental meeting so broad and catholic in spirit and policy that it should be essentially inclusive of everything good and exclusive of none, to the end that all creeds may be heard and the truth through a multitude of counsel be evolved.

In accordance with this conception the invitation to membership was so broad as to include every dentist in the world who was considered respectable and honorable. The only conditions were that he be a legal practitioner in his country and carry on his practice in accordance with recognized ethical principles. The dentist of affluence whose clientele is most aristocratic has no more right here than the humblest of those who honor our vocation by good work in the remotest country village.

Perhaps of no other profession of equal altitude and amplitude can it be said, as of dentistry, that its evolution is embraced within the span of one human life.

There are men living to-day, still active and officers of this Congress, who were in practice in the day of small things of our profession. They are with us, witnesses of the marvelous march of progress: veteran survivors of the noble army of investigators, inventors, authors, teachers, and honorable workers who, in various spheres, with diversified talents, with patient toil, with fidelity to present duties, and with hope and faith were achieving the victory which we celebrate to-day.

Other professions and other branches of the great healing art have made great strides in the same space of time, but of no other vocation or profession devoted to human happiness and amelioration, except perhaps photography and applied electricity, can it be said with equal truth, that for system and well-rounded development such a contrast can be shown between the humble acquirements and achievements of the youth of the men referred to and the ripened conditions existing to-day. Medicine, unlike mathematics, is not an exact science, but of all branches of surgery there is probably none in which the realization of the ideal is so nearly secured as in dentistry.

All vocations are entitled to honor where the work is honest and the ends sought for are commendable, but especial honor has ever been rendered to those vocations which deal with human ailments and sufferings, whether mental or physical, and to such vocations from antiquity the differential honor of the name profession, formerly more narrowly used than at present, has been given. The relative rank among professions is not unimportant, but can we not claim with proper modesty and truthfulness that for the prevention and

amelioration of human suffering, and for the peace, health, and prolongation of human existence, dentistry is to-day without a peer among them all?

It has been allotted to others to present to you the latest phases of every department of professional study, scientific, practical, and humanitarian, and to demonstrate the knowledge and skill in theory and practice. The ablest men in dentistry in the world will bring the products of their brains and hands before you. The week will be full to overflowing with interesting and valuable papers and discussions, with brilliant lantern illustrations of the patient and self-sacrificing investigations of men truly scientific, who have delved into the mysteries of cell-life, and will bring before our eyes the great unseen, wherein lies the foundation of all etiology and scientific knowledge and progress. Others with skillful hands working in harmony with active brains will demonstrate the manifold practical applications of theory and experience for our better equipment for the daily duties of the office.

In presenting to you this inaugural address, my duty it seems to me should be, not to anticipate or encroach upon the work of these others, but to attempt to give a brief outline of the evolution of the profession, with the salient points which mark its progress.

That dentistry to some extent is an ancient art cannot be questioned, but so meager are the references to it, in what remains that is authentic, that we may dismiss it from consideration at this time with the remark that nothing of value has come down to us from antiquity. The same is true of all the past up to the century preceding this. In fact, even as an art we may consider dentistry as modern, while as a science it is altogether modern.

Time will not permit me to review at length what is known of its condition in the last century, nor shall I refer but briefly to the conditions in the early part of the present century. The very valuable report which will be made by the Committee on History with so many co-laborers will, I have no doubt, give us a very full history, for the first time, of early dentistry in this country. This Congress would be well worth its cost if no other result should come of it but this.

There are no sharp lines of demarcation in evolutionary processes, and in their review we find the changes to be so gradual and long-continued that it is difficult to fix upon a time which is so distinctively marked as to be called a natal day. We have been accustomed to date the birth of a man from his advent upon the visible stage, and yet that day witnesses but a change of environment, and, as a large proportion of humanity believe, the birth of the soul dating

months before. So dentistry had its embryonal stage; its inception is shadowed by the mists of antiquity. Through ages it slowly gained, and we cannot describe its progress. During the last century and in the early part of this century there were signs of life and movement, the quickening had taken place, the world was expectant, and the joyful consummation, by the birth of a new profession, freighted with beneficence to suffering humanity, occurred in 1839, in the city of Baltimore, by the organization of the first dental college in the world. As a scientific profession that is its natal day. There had been life before, as in the case of the man, but the environment had so changed that now there was a new air to breathe, new sources of nutrition, the barrier of the previous restricted environment was removed, and there was free chance for growth to the stature of the full typical ideal.

Let us not forget to hold in the highest honor the devoted men who assisted at this birth. They are not the fathers of scientific dentistry—the primal causes date farther back—but their care, their oversight and efficient ministrations, in guiding and assisting in the culmination of evolutionary changes at its critical period, were most creditable. Like the Great Physician, they thought less of self than of humanity. They brought into the world the good “Evangel” of dentistry, for previous to that time knowledge and skill were guarded and sold as private property, while that day heralds the advent of “good tidings” to every man in search of knowledge for the good of men. The dental aspirant before that time found every avenue to knowledge carefully defended. Knowledge could only be obtained in the private office of a dentist, and the ambitious student was obliged to buy it, frequently at fabulous prices prohibitive to the majority. The dentist who had obtained reputation thus received considerable revenue from such seekers—and in time exacted a promise of the student to likewise guard the information imparted.

The Baltimore College of Dental Surgery was the first Thesaurus of dentistry. Here were first deposited the stores of knowledge which before were in individual keeping. Here, too, also for the first time in dentistry, for a stated moderate price, the student could draw from this treasure-house all the accumulated knowledge it possessed.

Let us bear in mind that the prominence given to the establishment of this first professional school, as marking a natal period, is not primarily because it was the first professional school; that is of course noteworthy, so is the establishment of a new manufacturing business in a community, for it may be followed by other enter-

prises, and so the place becomes prosperous—but the point should be emphasized, and it is the great point, that here was the beginning of a change of *spirit* as well as of method. Before this it was a trade, ever mindful of self, accumulative, afraid of competition, exclusive, faithful to the immediate patient and anxious to do him good, but regardless of the rest of the world, dominated by selfish interests, carefully hoarding knowledge, with no broad professional spirit—no brotherhood feeling.

It is hard to realize at this day when there is such freedom—such fraternal feeling, and actual competition to impart knowledge,—that such a contrast in professional spirit could have existed six decades ago. It is a fact, however, and there are members of this Congress who commenced their study of dentistry in the old way. In my opinion this change of spirit is at the foundation of the new era, and all progress since then may be said to rest upon it.

With similar prophetic vision and patriotic motives in this same epochal year, the great hand-maid and co-laborer of the college was established by the publication of the first dental periodical in the world, the *American Journal of Dental Science*. The same spirit—the same ambition for the profession and the same regard for humanity—actuated the generous and enthusiastic founders of journalism as of the college.

As human nature is constituted, the college and the magazine are not enough to redeem and to enlighten. A few are reached by these agencies, but to stir the great mass, such is the inertia of ignorance and routine, the magnetism of personal intercourse is needed. That the succeeding year, 1840, should witness the supplying of this requisite, is another proof of the vivifying forces operating at this period.

The same few pioneers of progress who started the college and magazine in 1839, in association with others of like spirit and motive on August 18th, 1840, met in New York and organized the American Society of Dental Surgeons.

No authentic records of any previous dental society exist. So this society may be respected as the prototype of the multitude of societies which since then can justly claim so great a share in the growth in which we rejoice to-day.

In the organization of this society, the resolution offered by Prof. Chapin A. Harris, for the appointment of a committee to draft a Constitution and By-laws, commenced with these words, which have proved prophetic:

“*Resolved*, That it is the opinion of this convention that the science of dental surgery would be advanced and the interests of all

well-informed practitioners and the community at large be promoted by the formation of a National Society of Dentists."

And in the constitution which was adopted, the first article struck the key-note for all time in these words: "The objects of this Society are to promote union and harmony among all respectable and well-informed Dental Surgeons; to advance the science by free communication and interchange of sentiments, either written or verbal, between members of the Society, both in this and other countries; in fine, to give character and respectability to the profession," etc.

We thus see, within a few months, the erection of the great tripod upon which all professional advancement must rest—the college, the journal, and the association.

The first aimed to thoroughly prepare the novitiate for the highest usefulness, while the broad field of the others was the great mass of practitioners of varied proficiency.

Dr. C. W. Ballard, of New York, in an essay describing the profession at this period, says it might be divided into three classes:

The first class, embracing about one-half of all in practice, "consisted of those whose ignorance was their only excuse for the injuries they inflicted upon their patients, and ultimately their profession, as also of those who, having purchased or traded for a secret or two, depended upon bold-faced and unblushing impudence for their success. . . . Such men could only stand high in their own estimation, by dragging the profession down to their level. . . . Dentists, to this day, suffer to some extent from the odium brought upon their calling by the acts of these men. Dentists of this class knew little, and cared less, about the duties devolving upon them, and yet they were always ready to receive pupils and instruct them in the secrets and mysteries of dental science, provided they were well paid for it. The fees exacted in these cases varied from five dollars to one thousand. . . . The length of time occupied by these initiatory proceedings depended very much upon the ability of the student and the ignorance of the teacher. It was generally conceded by these dentists, that the shorter the time wasted in this manner the better for all parties."

The second class, embracing about three-eighths of the whole number, "may be considered as consisting of those dentists who, having obtained as great a knowledge of the principles and practice of dental surgery as their time, means, or opportunities would allow, came at once to the conclusion that so long as they did the best they knew how for their patients, and comported themselves in other respects as became good citizens, they had done their whole duty. . . . With these may be included those who commenced

practice with little or no education, and were compelled, in order to compete with those around them, to add, by every means in their power, to the knowledge and experience that their practice was daily giving them. Many of these men eventually became, to a certain extent, good practitioners; but of the best of them it would be difficult to say whether the good or the evil which they had done in their day preponderated. Dentists of the second class were much better acquainted with their professional duties than those first described, and very many of them excelled in that branch of the practice known as mechanical dentistry; and, in justice to them, it must be borne in mind that, at the time of which we are writing, mechanical dentistry was considered, by a majority of the profession, to be by far the most important part of dental practice."

Those of the third class, about one-eighth of all, a good proportion of whom were medically educated, "had, as a result of their course of practice and deportment generally, acquired far more reputation and influence. . . . These few men seemed, from the outset, to have been impressed with the belief that the resources of the science were by no means developed—that dental surgery held a position far beneath that to which it was entitled . . . and that, as all these evils could and should be remedied, it was their duty to devote a portion of their time and energies to the work."

It will be found that this latter class, numerically so small, was the leaven which was to redeem the whole mass. The same law held here, as in material things, that the quality of the leaven was more important than the quantity.

In the year 1841 was enacted the first State law in regard to dentistry. It is probably also the first law in any country. I have not included legislation as among the important and fundamental causes of dental progress, for the reason that the Alabama law stood alone among the States in this country for over twenty-five years, the next law to be passed being that of New York in 1868. The English law was enacted in 1878, and in other countries about that date or later. While an indirect and inevitable result of dental laws has been to help the colleges by making an education a prerequisite to legal admission to practice, and hence to elevate the standards of the profession, there could be no justification for such prohibitive or restrictive enactments except as a safeguard to public health under the general police powers which in modern times have become so broadly applied and universally supported by the judiciary.

The struggle to secure these laws has been long and hard.

Many efforts have proved repeatedly unsuccessful, but opposition has been overcome until at the present date nearly every state and country has such laws, identical in object and essential features, and varying only in what might be called minor details. There are few now who doubt their justice and usefulness.

In securing their enactment the profession has generally taken a leading part, and it can be truthfully claimed that the motive has not been selfish but philanthropic.

The next event in dental history was so brilliant as to be worthy of being called the most notable and beneficent discovery of the century or of all centuries—anesthesia. What discovery or invention is comparable to this, by which “the knife of the surgeon is steeped in the waters of forgetfulness and the deepest furrow in the knotted brow of agony is forever smoothed away,” to quote the poetic words of the venerable, but still youthful author of the term anesthesia, Oliver Wendell Holmes? While there has been an ether controversy, there cannot be an anesthesia controversy. The ether controversy was waged with great earnestness and bitterness, but with the lapse of time and the removal of those directly interested, the credit is now generally given to the late Dr. Morton, a dentist of Boston. He it was who took his life in his hands, and, with sublime courage or audacity, put in jeopardy human life to solve the problem of anesthesia with ether. He traveled in darkness an unknown road; he succeeded, and demonstrated to a skeptical world anesthesia by etherization. The Massachusetts General Hospital justly and elegantly expressed the sentiments of mankind in its inscription upon the present given him in the words: “He has become poor in a cause which has made the world his debtor.”

Without detracting from the great honor due to Dr. Morton, greater honor is due to another dentist. For it is true, and is now being admitted, that Dr. Morton but traveled in another path, though further than had been travelled two years before to his own knowledge, by the true and original discoverer of anesthesia, from whom he derived his incentive, the late able, but less persevering and obstacle-overcoming dentist of Hartford, Dr. Horace Wells.

If we grant that the whole includes all parts, though one part may be so brilliant as to overshadow the rest; if we grant that an inventor of something entirely new is entitled to credit superior to him who invents an improvement or modification, even though the latter may be better; if we grant that the discoverer of a great truth or principle in nature is greater than the one who, following in the same lines, by using other agents or methods more fully or successfully demonstrates the truth or principle—we must admit that the

greater honor is due to Dr. Wells—provided it is true that, in 1844, two years previous to Dr. Morton's discovery, Dr. Wells did intelligently and publicly, with full appreciation of the phenomena, perform painless operations in dentistry and surgery by the administration of nitrous oxid gas, given for that specific purpose. I think that history bearing this out is too explicit, too minute, and too reliable to render this statement debatable. Let us inquire what are the admitted facts. It is accepted by every one as proven,

1st. That Mr. G. Q. Colton did give an entertainment in Hartford, in 1844, by the exhibition of laughing gas, for amusement.

2d. That Dr. Horace Wells was present in the audience.

3d. That Mr. Samuel A. Cooley, in his antics while under the influence of gas, injured his leg quite severely.

4th. That, on his recovery from the effects of the gas, Mr. Cooley was surprised at the injury, and said he had felt no pain.

5th. That Dr. Wells concluded from this that the gas would be useful in extracting teeth, and so expressed himself.

6th. That Dr. Wells did put his inference to proof by an actual experiment upon himself—Mr. Colton giving the gas and Dr. J. M. Riggs extracting a tooth.

7th. That his object, stated beforehand, was to ascertain by trial whether such exhibition of the gas would render tooth-extraction painless.

8th. That Dr. Wells did state at once that the operation was painless.

9th. That Dr. Wells did many times give the gas for painless operations in Hartford, both in dentistry and surgery.

10th. That Dr. Wells had such faith in his discovery that he came to Boston in the winter of 1844-45, and was introduced to the hospital surgeons by his former pupil, Dr. Morton, and did administer the gas at the Massachusetts General Hospital, for an operation, with the express pre-stated purpose of demonstrating that operations could be painlessly performed.

11th. That the exhibition at the hospital was only a partial success.

12th. That the students derided him, and that he went home to Hartford disappointed and disheartened.

13th. That Dr. Morton had knowledge of some of these facts— anterior to 1846.

14th. That the use of the gas as an anesthetic was discontinued in Hartford and elsewhere after Dr. Wells's death, and the successful demonstration of the efficacy of ether for the same purpose.

15th. That in 1862 the use of the gas for anesthetic purposes

was resumed, and that it has since been proven throughout the whole world to be a safe and reliable agent for that purpose by many millions of exhibitions.

The discovery of the efficacy of chloroform in 1847, and its rapid spread over Europe to the almost total exclusion of ether, gave such fame to its discoverer, Dr. Simpson, afterward Sir James Y. Simpson, that for many years in Europe he was generally reputed to be the discoverer of anesthesia.

These two anesthetic agents had the field almost exclusively for about fifteen years until the revival of nitrous oxid in 1862, so that most naturally the agent used and the resulting anesthesia became synonymous terms in the general understanding. It is not strange that the neglected and forgotten nitrous oxid during this long period should have had as companion in its oblivion the name and fame of Horace Wells. But its revival in 1862, and its general and successful adoption throughout the world, demonstrates that it is second to no other agent, and proves that its short use, before ether eclipsed it, was due to fortuitous circumstances in no way detracting from the merit rightfully belonging to the diffident, sensitive, generous and noble man, who so soon after, disappointed and with unsettled intellect, met his tragic death, but whose memory is still green in the field of his labors and in the hearts of his fellow-citizens.

With commendable regard for truth and history, his city and state have testified to his worth and achievement by erecting his statue in enduring bronze.

A very beautiful monument, commonly designated as the Ether Monument, was erected in the Public Garden, Boston, in 1867, by the munificence of a private citizen. The inscriptions read:

"In gratitude
For the relief
Of human suffering
By the inhaling of Ether
A citizen of Boston
Has erected this monument
A.D. 1867."

—
"To commemorate
The discovery
That the inhaling of Ether
causes insensibility to pain
First proved to the world
at the
Mass. General Hospital
in Boston
October, A.D. 1846."

At the time of the erection of this memorial, many of those active in the first exhibition of ether were still living and were friends of the donor. It is presumable that great care was exercised to make the inscriptions impregnable to criticism. Two things should be especially noted — the absence of any name and the restriction of credit to ether alone.

However we may view the question as to the right of first place of honor for Wells or Morton, we can congratulate the profession that both were dentists, and that this greatest boon of the ages came from our ranks. So great an authority as Lecky says, in his "History of European Morals," "It is probable that the American inventor of the first anesthetic has done more for the real happiness of mankind than all the philosophers from Socrates to Mill."

While in the following decade, 1850 to 1860, colleges, magazines, and associations multiplied and jointly contributed to bring the profession more and more in touch with progressive thoughts and truths, the most distinctive discovery of the decade and most momentous in its influences was that property of gold, which, previously considered detrimental, was now to be welcomed as its most valuable characteristic — cohesion. The introduction of crystal gold and the discovery of the cohesiveness of freshly annealed foil laid the foundation for the new era in operative dentistry. Let us never forget that while others claimed the latter discovery and doubtless had known of it and availed themselves of it for some time, Dr. Robert Arthur lost no time in freely sharing his discovery, as soon as made, with the whole profession. He thus achieved a distinction of which others have never been able to deprive him.

The descriptions and illustrations of operations with crystal gold in the essay of that venerable and respected Nestor still with us, Dr. W. H. Dwinelle, published in 1855, might still answer for an essay of to-day. Here was the renaissance of operative dentistry. Here was the dawn of the new era of restoration; the parting line between antique mutilation and disfiguration and the subsequent devotion to beauty and typical form. It was the first great advance in practice. It was but natural that it should soon be supplemented by improved instruments, the mallet, the rubber-dam and the engine. How great a revolution has resulted from these instruments and appliances none can fully realize, except those of us who have been long enough in practice to remember the struggles necessary in the old era. However radical or conservative are the views we hold to-day, there can be no question of the tremendous shaking up of the profession in its thoughts and practice which resulted from these innovations.

While most of the appliances just mentioned came in during the decade 1860 to 1870, they do not constitute, it seems to me, the distinctive advance of that decade. There had been a disease of the mouth, which up to this time had been either unrecognized or regarded universally as incurable. It had from a remote period been described in the books as scurvy of the gums, or some such term, and had been treated only by washes or medication. It was considered inevitable and irremediable that sound teeth should be lost, self-extracted. A prophet arose who taught that such deplorable conditions were always preventable if taken in time, and frequently remediable by surgical treatment when the disease had made quite extensive inroads. He was received as prophets usually are, except by a few who early became his disciples. He was not a profound physiologist or pathologist, and did not present a theory or description, which met the approval of experts: but he had lived many years, was a man of observation and reflection, and while not scholastic or correct on every point, his observations had been clear and his deductions in the main correct, so that the treatment which he was the first to bring out and demonstrate is even at this day, after so many of our best pathologists have devoted much time to the study of the disease, accepted as the foundation of all treatment.

The men who knew him, saw him operate, were taught by him, and were successful in following his methods, were wont to call the disease after his name. This was not correct, we know, for he originated only a treatment and did not describe a disease: but the fact remains, and there are enough living to testify to it, that as a result of his life and efforts, of the seed which he planted, a dire disease has been robbed of its terrors, the profession has been stimulated throughout the world to study its etiology and progress, and the premature loss of teeth from this disease is no longer considered providential or respectable.

While operative dentistry has continued to ride constantly upon a flood-tide of progress and improvement, prosthetic dentistry has had its ebbs and floods. Sixty years ago the great mass of the profession were unskilled as operators, but fairly skilled as plate workers. They could not save teeth, but they could replace their loss. In plate work the culmination of prosthetic skill and artistic production came with the invention and perfection of porcelain or continuous gum. After the introduction of vulcanite, the general disuse of metals made laboratory skill of little value, and hence it was neglected or ignored in the preparatory training of the student. The manufacturers supplied a great variety of instruments, so that the forging, shaping, and tempering of instruments became almost

a lost art. The ease and facility of working of vulcanite not only called for little ingenuity and skill, but so obliterated the distinctions that the novice, after a few weeks of instruction and practice, could compete with the most experienced, and this important and most beneficial branch became the refuge and ally of incompetence and quackery. The evils resulting from the wholesale extraction of good teeth were most deplorable and cannot be estimated.

There has been grave doubt whether vulcanite in dentistry has been a blessing or a curse to the world. A superficial observer might contend that when organs so important to health were lost, it was a blessing that substitutes could be within the reach of all but those in abject poverty. But we know to what a shameful extent the Harpies in our number, by appeals to cowardice and cupidity, despoiled the mouths of the confiding public of millions upon millions of strong and healthful teeth to make place for their bungling, disfiguring, and filthy substitutes. It did seem for a time that the whole profession would be engulfed in a sea of obloquy. But the reaction happily came, the tide turned, and we can congratulate ourselves and the world that the danger is fast disappearing.

The increase in the number and the constant elevation of the standards of the colleges year by year, raised the ratio of the educated; the periodical literature was more generally taken and read; societies multiplied and did most valiant missionary work, Codes of Ethics were adopted and enforced; laws were passed for the protection of society, which, while licensing all in practice to continue practicing, irrespective of their knowledge or skill, raised a barrier against the admission to practice of the ignorant and incompetent. From all of these and other causes the tone of the profession was gradually raised, and juster and broader views of what was right and best for the patient became more and more prevalent.

But the cause more important than any or perhaps all of the foregoing for the increase of laboratory skill and the retention of teeth and roots is to be found in the invention of the modern artificial crown and its corollary, the bridge.

This is the distinctive improvement of the past twenty years. Within that period more than one hundred different crowns and bridges have been invented and published.

The result has been two-fold. It has made laboratory skill of more importance and value to the dentist than ever before, and it has arrested the great "slaughter of the innocents" by making the retention of the roots of teeth in the mouth, obligatory.

At various periods the separation of the two branches of practice has been urged by prominent men of each branch, but by

these inventions the two branches have been bound together in bonds which seem indissoluble.

The chief drawback to perfection in the past has been the inability of our art, however skillful, to permanently save some teeth. The inherent defects of structure or of surroundings made the best operations but temporary, and these teeth had ultimately to be lost and substitutes applied. Now, after all the worst has happened, the root is still of inestimable value for crowning. This invention seems to place a climax upon our art.

In recent years there has been an increasing interest in the deeper causes of physiological function and of pathological departure from normality. Histological investigations have been pursued with great enthusiasm and thoroughness, and the advances in other departments of microscopic research are largely due to methods which were first devised and employed in the study of dental tissues by ingenious dental microscopists. These fields of research are inviting to the student, but demand great courage and self-denial when cultivated by those whose labors are severe and fatiguing in the daily routine of the office. We rejoice that there are so many dentists throughout the world who are devoting their energies, after the day's work is done, to these problems. We shall be encouraged as well as edified through the week by the display of results already achieved.

How crude and speculative seem the theories of dental caries which obtained less than a score of years ago when contrasted with the brilliant demonstrations of the renowned American professor of Berlin, founded upon patient and protracted investigation after the most approved modern scientific methods. Though from unavoidable circumstances detained at home, he has shown his interest and coöperation by forwarding a paper. There are many others whose fame is not bounded by their vocation or their country. They are known to the world as scientists and cosmopolitans. However skillful and judicious a dentist may be as an operator, this sphere of his usefulness is limited in space and not far-reaching, while these men are working for mankind at large and for succeeding generations. In view of past victories may we not confidently expect that the etiology of other still obscure diseases, like erosion and pyorrhea, may be solved so that we can either prevent or successfully treat them?

Let us not grudge explorers of the unknown their only recompense, the meed of praise and applause for what they have done and will do for the profession and for humanity.

I am conscious that in this review of the past I have failed to do justice to the subject.

Time is so limited, and the field is so rich and extensive, that I have felt constrained to select for elaboration only those facts and movements which seemed to have had the greatest influence.

Joy and comfort have been brought to many repulsive or speechless sufferers by the improved appliances for the restoration of feature or of function resulting from malformation or disease. Orthodontia might be called a new art, from the great advance in knowledge of it and of the methods and appliances for correction, and recovery of usefulness and beauty.

But the most prominent of the prodigal topics which I have ignored is probably plastics, the increasing use of which has wrought a great change in practice, and been of incalculable benefit to humanity. From the time of the memorable controversy which caused the disruption of the first dental society to the present period, this subject has engrossed much time and talent in our societies and literature.

The so-called "New Departure" arrested the attention of every reader from its novelty and from its claim to be founded upon strict scientific experimentation. Laboratory investigations are valuable, if conducted upon strictly scientific methods; but is not a theory based upon the observation of the phenomena as they are presented in the oral cavity also essentially scientific, if the observer is competent and the series of observations have been correctly performed? In either case accuracy of observation in connection with a clear appreciation of exactly what constitutes the scientific method, and the intelligent application of that method in the elucidation of the point at issue, is what is needed. I do not, however, attempt to discuss this subject, but only refer to it as one which has had a great influence in stimulating thought, making us closer observers, and modifying practice.

The theory of the bacterial origin of disease, and antisepsis, have engrossed much study and enthusiasm. It seemed that we were on the eve of a solution of all etiology by the isolation of the specific pathogenic germ of every disease, and that to prevent or cure all that was necessary was to ascertain and administer the proper germicide. Clinical records, however, have failed to sustain the ardent expectations of the more sanguine. The germicide has taken a place subordinate to a strict observance of absolute cleanliness, and we see acknowledged the importance of *vis vitæ* as a factor in securing immunity from the attacks of bacteria everywhere present.

Light, however, is being shed upon many mysterious bacterial phenomena by a more thorough acquaintance with ptomaines, leu-

comaines, and the extractives which are toxic and auto-intoxicants. Fortunate practical results have come in the character of a great reform in the care of instruments and the sterilization of everything connected with operative work.

All through the years there has been an underlying hope that improvement of tissue and greater resistive power would result from advances in prophylaxis. Apart from the improved conditions resulting from changed manipulation like contouring, or greater care in cleanliness, little has been accomplished in purely dental prophylaxis. Special feeding for the teeth or treatment in the line of therapeutics has not rewarded patient trial.

The tendency of prophylaxis to-day is to develop along physiological lines by more special and minute observance of the laws of hygiene. Proper food, its preparation for assimilation, out-door exercise, in a word, rational methods of living, are no more important for the preservation of health than for the building up of tissues throughout the whole body, of such perfectness of structure and function as to be able successfully to resist deleterious attacks. Thus viewed, prophylaxis has made great strides, in which the teeth have shared as part of the general economy. These topics and many others merit more extended consideration as factors of progress.

While I have refrained from specific mention, with two exceptions, of the living exponents of progress, I cannot close without a brief reference to the many upon our Roll of Honor. It would be pleasant to name them, review their lives, and pronounce their eulogy. "They builded better than they knew," and the profession and the world are their debtors. Our duties are less onerous, our paths are more pleasant, our position among men more honorable, and the health, comfort, and relief from suffering of mankind greatly enhanced as a result of the lives and labors of the noble men who, in the language quoted before, were "impressed with the belief that the resources of the science were by no means developed, and that it was their duty to devote a portion of their time and energy to the work."

Some of these apostles of progress are known to us only by their records, but the form, the features, the voice, the presence of some of them are fresh in the memory of many here present.

Can we doubt their approval to-day of our assemblage, or of their presence among us and their benediction? This Congress is but a continuation upon the same lines, or a culmination of their patient, devoted, self-sacrificing work for God and man.

Under the authority of the trust committed to us by the dental

profession of America, we are now assembled and organized as a World's Dental Congress, to advance the interests of dentistry throughout the world. Science and art, twin outgrowths of mentality, should know no boundaries, nor should there be any schools of thought, treasure-houses of knowledge, or gymnasia for training to usefulness, with barriers founded upon race, creed, or nationality, where the health of humanity is involved. As dentists we meet here to-day, brothers of one family, with common interests, mutual respect, and unity of aspiration and expectations. With infinite care and labor the banquet has been prepared, and we are invited to partake of the ripest fruits of professional culture which could be gathered from every quarter. Let us partake joyfully, not for the pleasure of the day alone, but from the consciousness that each feast brings with it the earnest of greater strength to-morrow.

In my official capacity I bid you all welcome—a welcome to every American dentist, who has come with comparative ease, but an especial welcome to those who have traveled long and far, from foreign climes and over broad seas, bringing with them the choice perfumes and rare products of a different soil from ours, but which are indispensable to the adornment and complete furnishing of the universal banquet of good things for us and for mankind. That these may find their visit both pleasant and profitable is the wish of every one of their American hosts. And finally, let us all improve the opportunities presented, that this week may be so full of inspirations and valuable results that it shall be a mile-stone in the march of dental professional progress.

RESPONSES BY REPRESENTATIVES OF FOREIGN LANDS.

Following the president's address, the representatives of foreign countries were announced by the chairman of the Executive Committee. They were welcomed by the president of the Congress and responded as follows:

DR. GEORGE CUNNINGHAM, Cambridge, England. Mr. President, Ladies and Gentlemen: Allow me to thank you for this cordial welcome, this "Niagara" of applause with which you have greeted the name of Great Britain and Ireland. To me it is oppressive because I am not too proud of the representation of my country here to-day. I am not really present as an official representative, and I regret that those of us who were appointed as honorary officers found it necessary to bow our heads to the decision of our representative associations adverse to sending official delegates.

A corporate body is said to have no conscience. And in this instance, owing to most regrettable misunderstandings, and, I must confess it, a certain element of narrow-mindedness, we found ourselves bound to accept the decision of the societies to which we belong. The development of the individual is in advance of that of the corporate body, and so I assure you that I had numerous requests from many influential members of these societies to express their kindly feeling toward their American confrères, and their regret for the necessity of the official refusal of your kind invitation. "Say something, if you can, over there to show that there is no real antagonism to this Congress and its objects, which we wish all success," was the remark of more than one of our executive officers. I would call your attention to the fact that even those who have felt obliged to refuse the honors you have proffered them, have done active work in connection with the committee as a token of their kindly feeling, and desire to participate in the work of this Congress. I am sorry our representation is neither so influential nor so numerous as it ought to be, but we will endeavor to put forward something in the shape of papers, and will be even courageous enough to take part in the demonstrations, which I am told is a bold thing for an Englishman to do in this country. [Laughter.]

I cannot conclude without congratulating you on the fact that for the first time you are conducting an International Congress on true ethical principles, and therefore if to-day we miss faces we have seen, such as that of Mr. Mummery, on similar previous occasions, we are glad to note the absence of others, both British and American, who, being unable to attend similar national conventions at home, found a too facile entrance to international professional gatherings abroad.

I am perfectly certain that this Congress will be a great success; and as to the absent, I am convinced the greater loss is theirs more than ours.

I thank you heartily for the kind reception of these remarks.

DR. JOHN E. GREVERS, Amsterdam, Holland. Mr. President, Ladies and Gentlemen: I cannot find expression to say to you how much obliged I am for the honor you have conferred upon me in nominating me honorary president from Holland. Please accept my profound thanks. I congratulate you on the prodigious success of this Congress, and of those who have projected this grand universal reunion. It proves once more that Columbia in dentistry, as other things, leads the world. The Association of Dentists of Holland send their congratulations, and take great interest in this Dental Congress.

Dr. ERICH RICHTER, Berlin, Germany, said: I thank you for the honor conferred on me, and for the words of welcome tendered me. I am not a representative of all Germany, but of the German Association of American Graduates in Germany, and the Berlin Dental Association, which unites American with German degrees. Some of you will remember a time not over twenty years ago, when dishonor and disgrace were brought on American dentistry by a number of swindling concerns in this country selling degrees all over Europe. A good many availed themselves of this and disgraced the name of American dentistry abroad. That time has gone by, but it has taken years to convince the authorities in Germany of the difference between an honestly obtained diploma and a spurious license to swindle people under the pretext of being American dentists. As editor of the *Dental Journal*, I have been fighting for the honor of American dentists in Germany. Now Germany and German dentists have had an awakening from their slumbers by the astounding progress of American dentistry, and the chasm that has excluded American dentistry has been bridged. In behalf of the two societies I represent, I extend a hearty salutation of brotherly love and wishes for the success of the Congress, and the hope that it may promote brotherly feeling the world over. Let us not feel that when another practitioner comes among us, he is taking our bread and butter off our plates. To protect American dentistry, allow no one to leave its schools who has not thoroughly and diligently pursued the course of study required. The practice in Germany has followed mostly in American footsteps; true, the etiology of caries was discovered in Germany, but the discovery was made by an American, Dr. Wm. D. Miller.

Dr. OTTO ZSIGMONDY, Vienna, Austria, extended his thanks on behalf of the people of Austria, for the invitation extended to that country by the World's Columbian Dental Congress, and said that his colleagues in Austria took great interest in this Congress, and wished it unlimited success.

Dr. J. A. BARRIE, of Paris. The honorary officers, confrères, and different sections of the World's Dental Congress and honorary members of the Executive Committee: The Association Generale of Dentists of France, assembled on the 30th day of July, without distinction of members, societies, or schools, send to the officers of the World's Dental Congress their sincere congratulation for their laudable efforts, convinced that this great professional meeting will be very advantageous. They hope for its success and send greetings.

In the name of the Dental School of Paris and also of the Association Generale of Dentists of France, we greet this great American nation. We bring best wishes for the success of this Congress, persuaded in advance of that fact by the celebrity enjoyed by the members of the profession on that side of the Atlantic.

DR. R. H. PORTUONDO, Madrid. I am more than proud to represent to you my country—Spain. I am sorry I am alone, and I cannot express to you what appreciation my fellow-men have towards all of you, not only Americans, but to all of you from all over the world. I cannot help but be proud when I remember the history of the discovery of America and its results. Although I am a Spanish gentleman, I am a graduate of an American college, and I am more than happy to return to this country and see all of our fellow-members. I wish the Congress the highest success. I am sorry I have not been able to make my speech in your own language, in words to thank all these gentlemen for their kindness and the efforts with which they have received us all.

DR. ANTONIA MELA, Genoa. Dr. Mela, of Genoa, and Dr. Bowman, of Bologne, were nominated by the council of direction to represent the Odontological Society of Italy, at the International Congress to be held at Chicago. Hoping that all subjects in the dental art will be treated in a manner that will advance and profit our noble specialty, and glad of this grand advancement, our confrères await from the said Commission a report of its work and of the communications received from different countries.

DR. CARACATSANIS, Athens, Greece. Mr. President, Ladies and Gentlemen: I salute you. Allow me, gentlemen of the executive, to thank you for the honor you have conferred on me in making me honorary president from Greece. I congratulate Americans, and hope my own countrymen, who are friends of progress, may always in future take part in such meetings, and may bring to their own country that knowledge which America must be proud of having acquired. The object of our assembling here is for the promotion of a science which can best improve the condition of mankind and promote the progress of health. We heard of an American Congress when at Paris. May the results tend to make life more endurable, and enable us to practice beneficially to our respective countries.

DR. PAUL ADELHEIM, of Moscow, Russia, sent a telegram welcoming the assembling of the Dental Congress.

DR. J. S. BURRETT, Uruguay, South America, said: I am, I think, the only representative of the smallest Republic in the world. I feel in proportion to this, addressing so large a body of learned men. I have watched the progress of your societies for many years, and always envied you the opportunities you have for progress. I have come now to rob you of all your science and all you know, to take out to the benefit of my little country. I thank you for your invitation, and I wish the Congress all success.

DR. EBEN M. FLAGG, vice-consul from the United States to Paraguay. At the request of Dr. Walker, I am to make my address in Spanish. I come from one of the smallest countries of the world. I am in no way prepared to make a speech, but think that the size of the welcome you have given me well repays a journey of about eleven thousand miles.

DR. ALFRED BURNE, Sydney, New South Wales. I shall confine my remarks to saying that it is a very great pity that the wave of depression which is now passing over the colonies has caused so many to be unable to present themselves here. New South Wales desired that I should be present to show our appreciation of American dentistry, as always shown by the fact that we send our students to America to receive their dental education. In behalf of the Dental Association of New South Wales, I wish this Congress every success.

DR. LOUIS ROUSSEY, Geneva, Switzerland. I am glad to say that there are in my country many who have more knowledge of dentistry and are more eloquent and better able to fulfill my task than I am. But I am here, and thank the president heartily for his kind speech of welcome. In my country the dentists are improving in their art by means brought about by American dentists.

Members of the honorary contingent of Americans in foreign countries were then called, who responded as follows:

DR. EVANS, of Paris, France, sent a letter expressing his regret that he was unable to be present, stating that considerations of partly private and partly public nature had caused him to feel it his duty to remain in Paris; the principal engagement preventing his coming being the desire to see completed, by October next, the Lafayette Home for young ladies who go to Europe to study art. Having seen the Centennial Exhibition at Philadelphia in 1876, he especially desired to see what progress has been made in the meantime

in dentistry as in other things. The American dentist is an American product, and there is an especial fitness in holding the Dental Congress on the anniversary of the discovery of America.

DR. J. M. WHITNEY, of Honolulu, Sandwich Islands, being called upon, said as the Sandwich Islands were now so near to being a part of the United States, he did not feel like being classed as representing a foreign country, and expressed a wish that the union might soon come to pass.

DR. R. H. KIMBALL, of Shanghai, China, said: I represent as large a country as has been called upon to speak. We have no association of dentists over there; perhaps eight American dentists are practicing between there and Singapore. I represent Asia only individually. I believe there is no one else who comes from that part of the world to this Congress. I thank you for nominating me as vice-president.

The president announced that the room of the Registration Committee would be closed during sessions, and that the floor of the meeting-room would be reserved exclusively for members of the Congress and ladies accompanying them. The same rules will apply at the clinical demonstrations, as also to the section meetings.

Adjourned to Tuesday at 12 M.

SECTION MEETINGS.

The section meetings were called for 2.30 P.M. Organization was effected in a number of them, but no papers were read.

SECOND DAY—GENERAL SESSION.

THE meeting was called to order by the chairman, Dr. Shepard, who called for representatives from foreign countries who were not present yesterday. Dr. I. L. Secher, of Copenhagen, representing Denmark, and Dr. K. Takayama, on behalf of Japan, responded and were cordially received.

The chairman then introduced Dr. Otto Zsigmondy, of Vienna, Austria, who read an illustrated paper entitled "Congenital Defects of Enamel," an abstract of which follows.

ON CONGENITAL DEFECTS OF THE ENAMEL.

That striking anomaly in enamel-development known as "erosion" or "atrophy" occurs quite frequently. In teeth so affected the coating of enamel is unequally distributed. In the lowest grades of the affection, superficial pits of greater or less depth

are found at isolated points in the otherwise apparently normal enamel. These pits may be isolated, or they may occur in rows. When the pits are confluent, furrows are developed which may embrace the crown like a ring. At times several of such furrows are found arrayed in series one above the other (furrows or wavy enamel). In other cases the enamel appears as if sown with small pits (honey-combed teeth of the English). In still other cases the enamel seems to be entirely absent at certain points, and the dentine itself comes to the surface (called *erosion en échancrure* and *erosion en nappe* by French writers if the defect affects the free edge of the cutting-surface or the front teeth to a greater or less extent)

The layer of enamel lining the pits possesses a rough, uneven surface, a more or less yellowish or brownish color, and lacks the proper polish and normal transparency, while the enamel in the immediate neighborhood of the spots has all the characteristics of the perfect tissue. In those teeth in which the dentine is exposed or covered by a thin layer of enamel only, the enamel of the normal portion of the tooth stands out in the form of an annular swelling, a circumstance which has influenced certain authors to speak of the thickening of the enamel at those points. But, as can readily be seen in sections of such teeth, a true increase in the thickness of the layer of enamel above the normal never occurs. While the surface of the enamel is seen on cross-sections to be interrupted, dipping into the pits and furrows, the margin of the dentine seems unchanged to the naked eye. Thus portions of different thickness are found in the layer of enamel. Spots entirely devoid of enamel are found but very rarely. Spots entirely deprived of enamel, as a rule, soon succumb to caries, especially as the dentine of such teeth possesses a faulty structure conducive to the progress of the affection at those points where no enamel is present. It is characteristic of the defects in question that they are always symmetrical, so that corresponding teeth in the upper and lower jaws on both sides are similarly affected. The defects occur in the teeth whose development corresponds to the same period of time, and in the teeth they are limited to such portions as correspond in degree of development. The situation of the defects and their distance from the lateral surface of the crown accordingly vary in the different orders of the teeth. At times, if the interference with the development occurred at a very early period and no interruption in normal development took place later, it is only the first four molars, the first of the permanent teeth to harden, which show signs of abnormality. The defects are then found at the apices of the cusps only, which in consequence seem as if worn down. If the interruption of normal development occurs at

a later period, when the formation of the enamel of the cusps of the first molars is further advanced, these teeth show the defect more in the direction of the root. In this case, beside the first molars, the central incisors likewise show defects in the enamel of the teeth which come next in point of time of calcification.

If the disturbance be repeated once or oftener, a corresponding series of furrows or pits will be found in the enamel of the teeth which were in process of calcification at the time of interruption of the development. If a furrow be found in the first molar near the edge, an analogous defect will appear half-way up on the crown of the central incisor. The cuspid will show the defect nearer the point of the cusp, while the first molar and the teeth which undergo calcification later will be free from defect. The lateral incisor of the upper jaw, it should be remarked, differs from the corresponding tooth of the lower jaw, whereas its calcification follows that of the central incisor of the lower jaw and precedes that of the cuspid. Calcification in the upper jaw proceeds as follows:

1. The central incisor.
2. Cuspid.
3. Lateral incisor.

This noteworthy circumstance, as yet inadequately studied, determines why we find the lateral incisor developed almost normally, while defects are apparent in the enamel of other teeth of the upper jaw. I shall not stop to consider these phenomena more at length at present; the necessary data will shortly be given in a publication by my friend G. Cunningham, of Cambridge, England.

The first molar is but rarely the seat of typical defects, the second molar still more rarely, and no instance of such defect has ever been observed in the two last molars. Certain writers maintain that the milk-teeth never exhibit typical defects. This, however, is a mistake. Temporary teeth are occasionally observed which resemble permanent cuspids and molars in defects of the enamel, and whose internal structure also shows the discontinuous lines which are characteristic of the teeth in question.

The question of the etiology of these deformities has often formed the subject of lively discussion. Seeing that the anomaly is hardly ever limited to a single tooth, as would be the case if the cause were purely local, but involves in the majority of cases the entire denture, this circumstance compels us to seek for the cause of the anomaly in general diseases of the organism whose effect as regards the other tissues of the body has vanished, while its influence has become permanent in the teeth.

Rachitis, scrofulosis, syphilis, the exanthemata, convulsions,

meningitis, grave attacks of suffocation as, for example, from whooping-cough in early life, have been the alleged causes of the disturbances to the normal development of the teeth in their follicles. In view of the literature dealing with the subject, it is rather astonishing that the microscopic examinations of teeth so affected should have been almost entirely neglected, as this must form the basis for the solution of the question of the cause of the deformities. A point of capital importance is the evidence that the disturbance in development can also be observed in the dentine. The latter is not uniformly calcified in all its parts. We observe in sections of the same at points corresponding to the fundamental strata, well-marked lines which consist of interglobular spaces arranged in rows. These lines are sections of strata in which incomplete calcification has taken place.

The few data contained in the literature bearing on the structure of teeth with defective enamel are presented by C. Wedl, in his "Pathology of the Teeth;" R. Baume ("The Defects of the Solid Substance of the Teeth," Leipzig, 1882); A. Walkhoff, "A Contribution to the Theory of the Lines of Contour and to the Physiology of the Dentine," *Deutsche Monatsschrift für Zahnheilk.*, 1885, p. 576, and Charles S. Tomes, "A System of Dental Surgery," third edition, 1887.

We are indebted to Frank Abbott ("Congenital Defects in Enamel," DENTAL COSMOS, 1891, p. 605) for more extensive data on the structure of imperfectly developed enamel. The enamel-prisms are characterized according to this author by their wavy form, and are interrupted by delicately marked concentric striations.

Penetrating the enamel at varying heights are seen numerous pear-shaped prolongations of the dentinal canaliculi, some extending nearly to the surface; these spaces contain protoplasm, and are stained a deep violet color by chlorid of gold. At several points layers of enamel with granular pigment are seen, where the enamel has not been thoroughly calcified. In one case Abbott observed an anomalous outgrowth of enamel upon the normal enamel. In another case an originally deficient enamel was found on which was deposited a normal one.

The question whether the enamel formed coincidentally with the interglobular spaces in the lamina of the dentine may not also show traces of interruption to the normal development, finds no answer in the literature of the subject. Researches undertaken with this object have shown that an analogy between the lines of the dentine and the tissue of the enamel really exists.

Longitudinal section of a tooth affected with the simplest form of defect in the enamel, a furrow enveloping the crown, shows that

the layer of enamel in the situation of the defect becomes gradually but progressively thinner in a direction from the apex of the crown to the root, until it reaches the deepest point of the depression, where the enamel becomes reduced to an insignificant layer varying in amount in different cases. The enamel rapidly regains its normal thickness from the deepest point of the depression in the direction of the root. The external boundary line of the enamel gradually approaches the surface of the dentine, whence it suddenly turns sharply outwards. If the section be sufficiently thin we observe a delicate but well-marked line, broken here and there, which traverses the whole extent of the enamel as far as the surface of the dentine, and in direct continuation of the first portion of the line limiting the defect and running in the same direction. This line makes an angle of fifteen to thirty degrees with the surface of the dentine. Its direction is thus as a whole the same as that of the brownish parallel bands of Retzius, which frequently occur in considerable numbers in the adjacent enamel. In cross-sections we see the line running parallel to the surface of the dentine and surrounding the entire crown of the tooth. The position of the line is therefore such that it is to be regarded as the section of a plane which divides the portion of enamel first from that deposited subsequently. It is probably correct to assume that it marks the limit of calcification of that portion of the enamel deposited at the time when the cause of the disturbance of development made itself felt. If a section of a normally developing tooth be examined and the lines of demarcation between the latest deposit of enamel observed, it will be found that the layer of enamel reaches its greatest thickness at the free extremity, at the cutting-edge, or at the summit of the crown-points where calcification commences, and becomes gradually attenuated toward the roots.

The enamel-prisms corresponding to the first portion deposited are already developed to a considerable extent as regards length, while the prisms of the remaining part are not so far advanced, and in that portion still farther distant from apex of the crown calcifications were observed to have only begun in the prisms. The enamel-cells in the region of transition between the internal and external epithelium of the enamel have at this period not yet begun the formation of enamel. If the disturbance to the nutrition of the enamel occurs at this time, those cells of the enamel which have produced the prisms already calcified to a considerable extent are destroyed, hence the further development of the prisms becomes impossible. Those prisms belonging to the enamel situated nearer the crown of the tooth not being developed to the same extent,

while suffering some interruption in development, nevertheless continue to progress after the disturbing influence has ceased to make itself felt, and may in many cases attain their normal size. The prisms in the region of the neck of the tooth in which calcification has not yet begun at the time of activity of the disturbance, of course suffer no interruption to development.

The line of interruption above described is always found in all forms of defective enamel. Where the surface of the crown shows two or more furrows, the layer of enamel is seen on longitudinal section to be separable, with a corresponding number of strata, by lines extending from the furrows to the surface of the dentine. In those cases, also, where the defect consists of only a pit-like depression, we find the line of interruption on longitudinal section. It is exactly like those cases where the crown is embraced by a furrow on cross-section; it is noticed that the line stretches from the bottom of the pit on both sides and surrounds the entire crown.

I cannot leave the subject without making a few remarks on the nomenclature which has been used to describe the defects under consideration. Terms which are appropriate for a great many cases, such as "wavy enamel," "honeycombed teeth," "furrowed teeth," and similar expressions, are not suitable in every case. The descriptive appellations "syphilitic" or "rachitic" teeth are to be rejected, because it is doubtful whether the diseases are the real cause of the defects, and if they are a cause they can only be so in a small proportion of cases. The term "atrophy" is likewise incorrect. The expression "erosion" is no less to be rejected. Erosion signifies loss of substance by mechanical force. The term erosion is properly applied to the notch-like grooves found on the neck of teeth, and which have been produced by the use of gritty tooth-powders, etc. I shall take the liberty of offering the following: Where individual organs or part of organs are defectively developed because of external or internal noxæ, pathological anatomists are wont to employ the term hypoplasia to express that condition. We may accordingly speak of a hypoplasia of the enamel.

May I be permitted to express the hope that this term may soon find a place in the literature of the subject.

DISCUSSION.

THE PRESIDENT. The paper is now open for discussion.

DR. J. J. R. PATRICK. Did the essayist ever observe the crescentic form of defect in the deciduous teeth, the so-called Hutchinson's syphilitic teeth? I never have, and I would like to know if any other member has, as I have disclaimed that this crescentic

form of defective enamel is produced by hereditary syphilis. If it is, we must certainly expect to find this form of defect in the deciduous series; if not, then it cannot be attributed to that disease.

DR. ZSIGMONDY. I have observed just the same defects in the deciduous set as in the permanent set. I have passed around a bottle containing two cuspids of the deciduous set, where defects appear just as in the permanent teeth, and which exhibit the characteristic microscopic structure.

DR. PATRICK. Did you ever observe the crescent form, the so-called Hutchinson's tooth?

DR. ZSIGMONDY. Yes.

DR. G. V. BLACK. The question is this, as I understand it; has the gentleman observed the atrophy of the middle lobe of the central incisors, producing the crescentic appearance described by Dr. Hutchinson as being characteristic of syphilis?

DR. ZSIGMONDY. No, I have not seen it in the deciduous central incisors; these teeth are very much more liable to decay; but you will find here, if you examine the cuspids which I have exhibited, just the same effect as you find in the permanent teeth. I have made microscopic slides, and I find the same line of interruption as in the permanent set. This was not, however, in a syphilitic case.

DR. PATRICK. What was the age of the patient when those teeth were extracted?

DR. ZSIGMONDY. Ten years.

DR. PATRICK. We all know if there are any congenital defects in the enamel of the deciduous or the permanent teeth, they must have their origin when that enamel is formed; and if hereditary disease is the cause of such defective enamel, it must necessarily affect the deciduous teeth first, that is the point I wish to make. All eruptive diseases during gestation must necessarily affect the enamel of deciduous teeth if the disease takes place during the formative process of the enamel. Can it be otherwise? I have already put on record three very remarkable cases bearing upon that subject, the effect of eruptive diseases on the enamel.

DR. L. L. DAVIS. Do I understand Dr. Patrick that his question to the essayist implied that this condition was not found in the temporary teeth?

DR. PATRICK. I want to know whether he ever observed the crescentic form.

DR. DAVIS. I have a case in my practice at the present time—a child patient who has the Hutchinson notch very clearly defined. The child is twenty months old.

DR. CUNNINGHAM. I think that we ought not to allow a paper of this kind to pass without some acknowledgment of it. I think anyone who has been able to follow Dr. Zsigmondy's paper will have noticed that he has not at all gone into the question as to the cause of the defects. All that he has talked about is that there is something which causes an interruption in the process of development and leaves indelible traces upon the teeth. He clearly laid it down in his paper that he would not touch upon this subject, and I think most of us will admit that the subject is far from exhausted; and I will say that for Dr. Zsigmondy and myself we are oppressed with the difficulties that are before us in this investigation. I think it is important for us to give attention to something which Dr. Zsigmondy has carried farther than any other person, the historical investigation of this subject. He has laid the points before you as a preliminary investigation, and I am certain that when you get an opportunity of reading and studying that paper you will find it to be full of merit.

Further, I would ask those who are interested in the subject to examine his remarkable specimens, which he will show under the microscope at a more convenient opportunity; and I would suggest, Mr. President, if it were feasible, that the Section more especially charged with the subject might fitly discuss this question and continue it after an inspection of the specimens and having read the paper more thoroughly.

With regard to the question of the presence of enamel defects in the temporary teeth as well as the permanent ones, there can be no doubt, but we have nothing to say as to what the causes are. With regard to this line of interruption which he mentions; this is a new fact brought before us in a very interesting way. So far as the microscopic appearance is concerned, no other defects appear upon the coronal portion of the tooth; yet when you examine the sections through the microscope, you find this line of interruption appearing. It must have been due to the same cause, because it is a much larger defect.

Those who are more familiar with the development of the cap of dentine will see further that the calcification is not an even and straight line, but it is wavy, and the waviness will account for that defect.

In studying this question, you will find the defects may be little or great, and the duration may be short or long; we find a great variety of defects.

I think we owe a debt of gratitude to Dr. Zsigmondy.

Erosion according to the Americans means one thing, to the

English it means another, to the French it means another thing. There is no doubt but that the term which has been suggested, Hyperplasia, is in conformance with recent researches in pathology.

Further, we have had suggested in addition that in talking of enamel defects to distinguish them from hyperplasia, which might be a term also applied to the root or cementum of the teeth, the use of the term coronal hyperplasia, not confining ourselves to the enamel, because it is perfectly evident that these interruptions of development affect the dentine as well as the enamel. In giving it a name we must take the name, if we possibly can, that will appeal to the whole structure.

DR. C. C. CARROLL. One word in relation to this: I have listened to that paper with a great deal of interest, because of the word "hereditary" in the title, from which I looked for a discussion as to the cause of this disease to which the paper has been addressed, and I expected to find in that paper the hereditary line defined and the character of the disease indicated. The gentleman from Cambridge, Dr. Cunningham, disclaims any effort to assign the cause of the disease. I put myself on record last year at Niagara Falls on this subject, in reference to a very similar case presented by the gentleman from Buffalo, in which there was erosion or lack of enamel over an entire tooth that was there presented, and it was claimed that that was the result of congenital inheritance.

SECTION I.—ANATOMY AND HISTOLOGY.

ADDRESS OF R. R. ANDREWS, CHAIRMAN, CAMBRIDGE, MASS.

It has been deemed proper by the authorities of this Congress to honor me with the chairmanship of this, your Section. I wish here to thank them for their confidence and good-will, and to ask your indulgence for any shortcomings that may be caused by my inexperience. It is an especial honor and privilege to greet you to-day in the name of the great interest of dental progress, of which, as a part of the Congress now in session, we have heard so much in praise in our president's address. We are met in the midst of unusual surroundings. Yonder is the beautiful White City, where the world has measured its genius with every age and every land of material progress; it lays with pride its laurels of victory upon the brow of our illustrious century. It is there we may observe that in every department of intellectual and mechanical achievement, no honors are so great as those that are justly awarded to men who think. Thoughtful and intelligent workmanship is, in every grade of labor, the only price a true success can pay for the benefits of a real and

solid progress. Quick returns to an indifferent and sordid practice can never build up a substantial profession, nor win for itself the recognition of truly cultured men. Dentistry has, in these last few years, held to a straight and stringent rule of ethics, declaring deep principles of professional practice, and holding forth to every practitioner a standard of high attainment. As a profession, we should not be content to have private enterprise found and establish schools of dentistry; such private enterprises should, in the future, be made to yield to a more central plan of professional education. The dentist should be no product of narrow methods hurried along some line of individual practice, into the ranks of a calling which has no limitation of government, no recognized central authority. Our schools must be the schools of the dental profession, superintended by that profession, and its diplomas given in its name and by its authority. The high standard which we should exact from every dental graduate would in time exert an influence on our future scholarship and skill in workmanship, which would entitle us to the place we would fill among the professions. In my judgment, dentistry should not be one of the fugitive and obscure callings, irresponsible and independent; it should seek to fill an honorable place in the ranks of the great medical fraternity, where I believe it justly belongs. Our place is, and ought to be, among the specialties of the great guild of physicians. The oculist, the aurist, and the dentist should stand side by side, part of the great body of scientific workers who heal the sick. And to this end we must bring all the intelligent influence we can exert to place our noble profession on a splendid equality with "the best among the noblest."

And have we not offered much already as our contribution to the development of the sciences of medical practice? Our histological and pathological literature, our mechanical inventions, our ever-increasing discoveries with chemistry and the microscope, all show with what far-seeing study and native originality our students apply themselves and claim their places among the scientific explorers and molders of scientific thought.

We are not here merely as idle spectators of what the world has sent, from its busy industries of brain and muscle, but we are here in the name of our profession to join our contribution to theirs in this world-wide exhibit of results. Are the members of any profession more honored to-day in the world of science than many of our own? May we not be justly proud of the scientific work of Tomes, of Magitot, and Miller? And the list does not end here. There are many others who have given the best thought and work

of their lives for the elevation of the profession they have loved so well.

In closing, gentlemen, I must remind you that we have with us to-day distinguished representatives from abroad. In the fraternal bond which unites us in a common service, we fear no rival jealousies or factitious criticisms. Dentistry belongs to no one nation; it belongs to the whole world, and we invite with sincere acceptance the competition of professional thought from every quarter. We greet you, gentlemen, with true American hospitality, and bespeak for you from each of the representatives of our national and state organizations the cordial welcome of a friend.

And now I have done. Let us have a free and open arena for discussion; let fraternity and good-will dominate our council, and we shall mark the work of our Section of this Congress of 1893 as one of the most productive of good results we have ever held.

Let us now proceed to the business of the hour.

Dr. W. G. A. Bonwill, of Philadelphia, then read a paper of which we present the following abstract:

WHAT HAS DENTISTRY TO DEMONSTRATE AGAINST THE HYPOTHESIS OF ORGANIC EVOLUTION?

Evolution has permeated every shade of thought and work, and some of the best minds have become imbued so far as to quite affirm that it is no longer a hypothesis, but a stable truth.

As a free thinker and worker in dentistry and cognate science, Dr. Bonwill believed he had some right to be heard for what forty years of research and demonstrative work have placed before the world, and he had in the argument he should present what seemed to him truth for a basis. After referring to an article in *Lippincott's Magazine* in 1889 in which he had set forth a synopsis of the points of the laws he should present, Dr. Bonwill read the following claims:

I claim, first, that the human jaw and teeth show, beyond doubt, the workings of absolute laws which gave them the highest efficiency, and from which organization there could be no change except retrogressive, not progressive; not to higher form.

Second—The human jaw is based for its organization and workings upon the principles of the equilateral triangle, which as well underlie the shape of every tooth and the numbers to occupy that equilateral space.

Third—Given the length of one arm of this triangle, say four (4) inches, and it can be shown from this alone how, whatever or whoever made the first human jaw, with a pair of dividers and a

straight-edge the size, shape, and number of each tooth in both upper and lower jaws and their absolute places therein were made; and further what should be the exact arch containing the six incisors in both jaws, and the action in mastication and incising of food.

Fourth—That the human jaw is no exception to this rule. That the proportions of the human body are found on the equilateral triangle, and, unless so, no fittest organization could have ever existed or been brought into being, nor could it ever have been reached unless by the same rule at the very beginning of its existence.

Fifth—That, if the hexagon cell of the honey-bee, which cell existed before man, is incapable of change to make it fitter for the object for which it was designed, then we can claim it as a precedent that the same principle in the human jaw is none the less true and demonstrable.

Sixth—I claim not only to have discovered the laws by which organizations are made, but have perfected the drawings from these laws by which any skilled artisan or mechanic can reproduce and duplicate artificially, what the working model, here presented, demonstrates, and its action shows, beyond doubt, the highest efficiency in such an arrangement, based simply on the principle of the equilateral triangle.

Seventh—If the human mind cannot conceive of a fitter organization than is here demonstrated and produce it from the laws and principles of evolution, then there can be no progression to a higher state that can form a basis of argument for the evolutionist.

Eighth—That, if no one can show any fraud in this work and the claim of "an ultimatum not having been reached" by a human being, it must follow that nature, who had the first chance at the building of organizations, must have done her best and made the very fittest in the beginning.

Ninth—It is claimed that natural selection could only have reproduced a pre-existing organ or organism or previous type, and could add no new organ or alter the form of the pre-existing one to higher efficiency.

Tenth—That mechanical means, which can only be externally applied, cannot even reproduce an existing type, let alone form an additional organ or organism.

Eleventh—There is no proof that when any organ has once been lost it has never been reproduced in the same animal; while, in the progeny, the same organ will again appear. Nature will patch up in order to prolong life, but never in one lifetime make the effort to even reproduce the lost organ, nor lay the foundation

in the offspring to make an additional organ like the original or one of a higher efficiency.

Twelfth—The human jaw (to the glory of dentistry) furnishes one of the strongest or most absolute proofs of Claim 10 in the reproduction of the temporary set of teeth, which, when completely lost at the age of fifteen, again appeared in the offspring when there was no such organism existing at the time of procreation to give birth to an entirely new temporary set in that offspring.

Thirteenth—The dental apparatus affords the best proof of the working of a practical, scientific workman from pre-existing laws, and nothing but intelligence and a personality could have ever conceived and made such organs and organisms, and no further proof is needed of the purely scientific productions given in this discovery.

The calculations were largely based on the equilateral triangle, and their works are so perfect that, in the obelisk alone, not a line has ever been changed to make it more perfect. Polyclitus, 500 years before Christ, discovered that in the equilateral triangle, the square, and the circle, he had the laws and rules to show the perfect proportions of the human body. Plato placed this angle as the most important of all geometrical work.

The circle is divided into 360 degrees, and these again into the hexagon of 60 degrees, upon which the honey-bee has founded its cell of equilateral triangles. Its importance is as great as that of the circle, of which it is only a sixth, and it is equally perfect, because it fills space perfectly and no more can be crowded into the lines given.

No development of the equilateral triangle can be made, except to carry out the geometrical laws on which it is based; and it is the first practical shape given after the "point to a straight line—the shortest distance between two points—to a circle." It is the basal angle of all development of form. It is proven beyond doubt in the human jaws, their creation, perpetuation and preservation, without change to a higher form of organization, and must ever remain the basis of this complex organism, which cannot be changed to a higher type any more than its base can be.

From what will be shown you, any one conversant with mechanical drawing can construct a perfect set of human teeth as to size, crown surfaces, and positions, without ever having seen an original set, and can reproduce a working model of artificial teeth which, in the mouth, shall work perfectly as in nature.

The average jaw measures about four inches from the center of

each condyloid process to the median line at the cutting-edge between the interior central incisors. It is as long as five in many cases of the Indians and Malays, as well as some in all nations. The measurement must be taken from the lower jaw, as being the one of motion; the upper has to be made to conform to the special forms and measurements of the lower. The center of each condyle, being the center of motion, rotating on one condyle only—the other describing the arc of a circle by moving forward in the glenoid cavity—is the proper point from which to measure the angle. The examination of 4000 dead and at least 6000 living jaws attest this assertion.

The few cases where the angles do not hold true are among nations who compress the cranium. The human jaw, left to its own normal development, must always be an equilateral triangle, as is shown most beautifully and completely in all embryos from the period of formation of the lower jaw. I will go so far as to state that the human jaw was designed by first making the lower; and the dividers, from the same standpoint, while developing the lower, when carried over the arch or outer boundary of the lower, show the exact size of each upper and the distance they should be from the lower in order that, in the lateral and forward movement of the lower, one-half of the teeth, or from the median line to the last molar on one side only, should be in apposition for mastication and incising. The proportions of the upper teeth to the lower are as exact as any of the measurements shown.

The size of the arch of the lower jaw must be just one-twelfth of the main circle drawn around the equilateral triangular jaw, or the teeth could not be made to fill the space. And also to permit perfect lateral movement and action of all the grinders and cutting-surfaces in common in masticating and incising.

The mean diameter of the fourteen lower teeth, in line, measures the same as one line of the equilateral; when these fourteen teeth are thrown into a circle, they should completely fill that circle. The six incisors' mean diameter, in line, measures the same as the two bicuspid and two molars on either side, forming again an equilateral triangle. The six incisors of the lower jaw fill just one-third of the arch, the bicuspid and molars filling the remainder of the circle.

As the arch of the six incisors is the one-twelfth of the main circle, so it will be found absolutely correct that the one-twelfth of this smaller circle will give the width of the central incisors of the lower jaw, which shows why they should be the smallest of all the teeth.

The grinding or masticating surfaces will be found to have the

same absolute shape and curves, and each tooth surface varies in depth as you leave the incisors backward to the last molar. They have ever been and must always be so. The faces on all sides of each tooth in both upper and lower jaw vary as you find them in the arch. No one tooth can be substituted for another, they cannot be interchanged.

The teeth of each human being are so proportioned that the lower jaw cannot contain the teeth of the father and the upper of the mother, or *vice versa*. The laws are rigid, or else there would be no smooth working of the teeth one upon the other in action. Nature, left to herself, always brings proportion. It is this law that is herein stated, and if law has any value as a guide, then we have it to absolute perfection in this most wonderful piece of mechanism, which has no mistake of nature on its face, but, on the contrary, the mark of retrogression everywhere depicted from civilization and man's unwise interference.

In proceeding to the description of the working model and the drawings with which his paper was illustrated, Dr. Bonwill expressed his conviction that a careful study of the subject would prove that what he had presented was worthy of some consideration as a truly scientific way of getting at an *ultimatum* by which evolution shall be decided to be as much of a fallacy as it has been a hypothesis. He also invited those who were interested to come to him privately, for a more complete exposition than he could make in the time allotted to him here.

DISCUSSION.

DR. GEORGE A. MILLS, New York. Two years ago last winter, I had the pleasure of witnessing a demonstration by Dr. Bonwill; it made a profound impression on my mind. As far as the discussions are concerned and the truth of the statements made, I have to say that this paper is exceedingly valuable, although it may not be understood within the next ten years or perhaps longer; it is very important, and I think we have the basis in it for much valuable information and instruction.

DR. EBEN M. FLAGG, Paraguay, S. A. I am one of those who believe in trying to reduce the various manifestations of nature to mathematical precision. The essayist made one point, where he spoke of a monkey's eye-tooth, that inspires me to mention a little circumstance. Some years ago, we had a Paraguay monkey that was tame. One morning the monkey bit a child, and I made up my mind that that should not occur again, so all the canine teeth of that monkey were cut off flat. According to Dr. Bonwill's theory,

that monkey should have pined away and died; but instead of that, it lived, got very fat, and is now on board the United States man-of-war "Tallapoosa," where anyone can see him in a flourishing condition. Dr. Bonwill may say that this case was not parallel, that the monkey was pampered and fed with all sorts of luxuries, and therefore the rule did not apply; but if Dr. Bonwill does say so, what is that more than announcing the evolution of which he speaks?

DR. L. P. HASKELL, Chicago. These demonstrations of Dr. Bonwill are very interesting. As far as I understand his principles, it seems to me that they are admirable. I have been employing his method in the arrangement of the upper teeth. He commences with the lower ones; I have wanted for a number of years to see him articulate a set of teeth, starting from the foundation.

With regard to the upper teeth, I have for a long time been carrying out that principle. The radius of the circle is the width of the central lateral and cuspid. When I had a patient with a perfect set of teeth, I applied that circle and found it to be perfectly true. A line drawn across the posterior surface will come across the posterior margin of the second molar. But there is this fact: I select a set of teeth for a certain case, and take my dividers and measure. I am surprised to find how few circles are needed for the different sizes of teeth. I use my judgment for the various cases which come to me, of course. It occurs to me just at this moment that dentists are often at a loss to know what was the width of the superior teeth. If you have the six lower anterior teeth, you have a positive guide as to the width of the upper teeth. You will make no mistake in selecting the proper-size tooth, if you follow that method.

Dr. Bonwill said some time ago that Dr. Talbot made a certain statement, which I have learned Dr. Talbot never made. My attention was called to the fact that in ninety-five mouths out of one hundred there is a depression in the region of the cuspid. I wish the term "canine tooth" were banished from our text-books and vocabularies. What is the use of applying the name of a dog's tooth to a human tooth? Cuspidati should be used instead, and would be just as well understood. In the region of the left side of the mouth in ninety-five cases out of one hundred, by actual count, there is a depression. The alveolar process is shorter on the left side than on the right. In many artificial sets you will notice that the teeth are shorter on the left side than on the right. The dentist has arranged his teeth by the model, and he gets the teeth shorter on that side. On the lower jaw, at the left side, it is very common that the teeth are higher and more prominent than on the right side. On the lower jaw, it is also very common that the right side is farther from

the median line than the left side. If you want to arrange the set symmetrically, you will find that you must set the teeth farther in on the left side than on the right, because the right side is so often more prominent. Why is this so? I have been asking the question many years, and have finally adopted Dr. Talbot's theory. The majority of people bite their food off on the right side of the mouth. It is more common to masticate on that side of the mouth, and therefore the right side is more developed than the left. I held on to that theory until two or three years ago Dr. Talbot became interested in the difference between the two sides of the jaw, and we made several careful examinations of models which I have in my possession. Dr. Talbot did not say that we could not or did not chew on both sides of the jaw; what he said was that the lower jaw moves from right to left in mastication. We do not chew from left to right. You can chew on the left side of your mouth, but try to throw your jaw from left to right, and you will see how awkward it is. The result of this is, that there is a gradual change in the alveolar process. Throwing the alveolar process to the left naturally makes a prominence on the right side.

DR. J. J. R. PATRICK, Belleville, Ill. I am sorry that I am not capable of discussing this question, for I have not studied mathematics sufficiently. This is equal to a display of pyrotechnics. I am almost appalled. I shall not attempt to answer the essayist in detail, but, fortunately for me, he has laid down, in the commencement of his essay, a series of propositions which I shall take the liberty of analyzing.

The first one is, that the human jaw and teeth show beyond a doubt the workings of ultimate laws, which give them the highest efficiency, and from which organization there could be no change, except retrogression, not progression to a higher order. I would like to ask anyone what conception they have of progression without retrogression. Have you any conception of light without darkness? Too much light is darkness; too much light is death. We are creatures of circumstances. Everything in this world is relative; you cannot escape from it. You have no conception of progression without retrogression. One stands upon the other. You can take your choice. It may do for a rhetorician or a grammarian to talk about the past, present, and future. The past has not ceased before the future commences. There is no present. Put it as you will, the first proposition is rotten to the core.

The second clause is, that the human jaw is based for its organization and workings upon the principle of an equilateral triangle, which underlies the shape of every tooth. Am I to understand that

the mandible and the superior maxilla are equilateral triangles? I have always understood them to be parabolic curves. They have not an equilateral or a quadrilateral motion in any direction you place them. One of the most astonishing things is, that the essayist has not stated what kind of a lever a human jaw is. He has not told you whether it was one of the first, second, or third orders, and that has been known for over one thousand years—nearly two thousand years.

A well-developed mouth is peculiar. The principal muscle for moving the jaw is the masseter muscle. That muscle moves the jaw, but not on a triangle, it has a lever and a fulcrum. The power is placed between the fulcrum and the anterior portion of the jaw, which is to be moved at the angle of the ramus, and when that jaw either opens or closes, instead of describing an equilateral triangle it describes a circle. It cannot possibly do otherwise. There is no square movement in the human body. Not only in man, but in every animal in creation, the muscles and their attachments to the bone, which are the levers, are all levers of the third kind. My leg in moving this way (illustrating), is a lever of the third class; but when I spring on my toes, it is a lever of the first class. When I walk, I change the motion, and make the lever of a different class. When I lift my leg, it is a lever of the third class. The jaw never becomes a lever of any other kind than of the third class, because it does not support the body. The gentleman has failed to mention that in his essay. The triangle, equilateral or any other kind, cuts no figure in the motion of the jaw, because it moves on a fulcrum. The power is a certain muscle, attached between the fulcrum and the body to be moved, and it is impossible for it to move in any other manner than that of the arc of a circle.

According to this essayist it is based on the principle of an equilateral triangle, which underlies the shape of every tooth, and the numbers to occupy that equilateral space. I contend that it is not an equilateral space. The teeth do not follow that rule, because not one of them is an equilateral triangle. The lower teeth are parallelograms; the upper teeth are parallelograms rhombed, on account of the greater curve of the arch. You cannot get an equilateral triangle out of any one of them. You might model one, but there is none in nature.

As to clause third, it is merely a repetition of the second clause.

As to clause four, I will say that I am not a creator, nor the father of a creator. I am perfectly satisfied to investigate that which has been created for me. It is a bold man who will say that the Creator has made anything wrong, or that he could not

produce a human being on the square just as well as he could on an equilateral triangle. I am only sorry that he has not produced more men on the square than he has.

The essayist says he claims not only to have discovered a law by which organizations are made. Don't forget that. He has discovered it, and yet he cannot tell why he smells with his nose, and sees with his eyes. He cannot say why he should not see with the tip of his nose, and smell with his eyes, and yet he says he has discovered the organization. You cannot make an inch of progression, according to our essayist. You never need hope to have wings after that. How did the essayist ever progress to this point, if progression is a fallacy? Don't you know that you have to learn to count your fingers and toes, before you can enter on any such abstraction? Don't you know that single numbers have to be learned before millions? If I could not progress and could not learn, I would cut my throat. Why, the gentleman himself some years ago wrote an elaborate history on the Evolution of the Mallet. Evolution for the mallet, but for nobody else!

As to clause five, I will accept all the statistics, but I want you to prove the figures.

In clause eight, the essayist refers to an ultimatum. It will be necessary to know what an ultimatum is. If you contend with any man on a principle, and especially on anything that is of a scientific nature, you must always stop to ask, "What do you mean?" because most of the facts are ambiguous.

Dr. Bonwill speaks of fraud. I do not suppose any man here thinks that Dr. Bonwill would be guilty of a willful fraud. I know I do not think so. The man may be in error, but it is not fraud.

Nature never does anything really correctly. We all look like human beings, and yet there are not two of us alike. Take a family, and it is just the same. Take an artist, and his statuary, and what does he do to perfect a Madonna? He will take an arm from one, a leg from another, a breast from another, and when he has completed his work it has no real resemblance to any human being under the sun; and yet we know Nature better by his production than by the productions of Nature itself; because he has taken all the productions that Nature has been capable of, and by a skillful judgment, something that can never be taught, something that can be seen but never explained, he combines and produces a perfect form. There is no perfection. Take a full set of regular teeth, and you will find that some, to the right or left, have cusps in excess, or are deficient. They may be regular in alignment, but vary in form; and so, if there is a law that we know anything

about besides the law of gravitation, the law of variation stands prominent.

The essayist says it is claimed that selection could only have produced a pre-existing organism, or previous type. I do not know where he obtained that information; but I tell you, it is just the reverse of what is commonly called Darwinian advancement—just the reverse of what evolution has done, because one of the strongest arguments in evolution is the law of selection, and in place of producing pre-existing types, the law of selection produces other types. Go to any gardener or horticulturist, or propagationist, in either animals or plants, and he will tell you that it is only by acquired knowledge that they give us the fruits which are produced. You have not a flower in any garden which has not been produced by the law of selection. There never was a flower but what was a single leaf in its original state. They are doubled by a knowledge of the law of selection. The peaches or cabbages that you eat were single at one time, growing in brackish water, like a pond-lily. I am not a botanist, or I could talk to you for a month on that subject. We have not a single plant but what has been produced by the understanding of the law of selection.

As for clause ten, as far as mechanical means are concerned, there is nothing in existence but what is produced by mechanical law, bad, good, or indifferent, whether it is an improved type or a retrogressive type. The whole universe is moved by mechanical means. There is not a molecule in your body but what evolves and develops into a perfect organism only by strictly mechanical law. Take a human being, at the commencement of his existence, or any animal or vegetable, commencing with the seed, and go up to the perfect organization, *i.e.*, as perfect as it gets to be. Some only go half-way, and some a little farther. We are not all alike. If there were no such thing as progression, we could not learn anything. The mere fact that you can learn the alphabet shows that there is progression, and the mere fact that you began as a little bit of jelly, and finally became a muscular and arterial combination and become ossified in old age, shows that there is progression. Dr. Bonwill cannot deny that he has progressed.

As for clause eleven, I will say that in a large class of animals they do reproduce an organ, as, for instance, a crab or a lobster will reproduce claws. You rarely find a crab with two claws the same size; they generally lose them in fights. All the lower animals do that.

As for clause twelve, there are very many reasons, but it would take me a long time to show you why the deciduous teeth are a

necessity; and it is also a question of growth. The deciduous teeth are never replaced by other deciduous teeth, as the author seems to indicate; and furthermore, the deciduous molars are never replaced by anything resembling a molar. The permanent teeth that succeed the deciduous molars are generally bicuspid.

In conclusion, I wish to say that while some of the apostles and followers of Darwin have unfortunately exceeded their master, and carried his theory beyond anything he ever dreamt of, there is, on the other hand, a set of thinkers and writers who have never read Darwin thoroughly, and it is impossible to really deal with that subject of evolution unless a man understands comparative anatomy. One cannot comprehend Charles Darwin's writings without being a naturalist, and having a good acquaintance with comparative anatomy and of the natural sciences. You may believe in Darwin, but you do not understand him if you do not understand comparative anatomy. On the other hand, men write against Darwin who never read him, and who could not possibly do it. I would not say that any man could be scoundrel enough to come before an intelligent body of men, and talk upon a subject of that character, without having first thoroughly posted himself on the negative side of the question. I have known very able and educated men, who, when I pushed them to the corner, said they had not read Darwin, but they had read of him. My advice is, let Darwin alone. He is beyond your reach, and ever will be. I do not care what his doctrines may have been, nor do I know a more modest man, a more sincere thinker, a clearer thinker. He has captivated the greatest brains in civilization in every department of natural science, and it becomes us to simply do him honor, and leave his doctrines alone.

DR. BONWILL. I have heard but very few words of what the gentleman has said; but I do not want any better evidence of the animosity and ridicule which he brings than in the countenance which he displayed throughout it all. What have I come here to show you? What has this gentleman said in order to contradict me? So far as my conclusion is concerned, that is another question. He is one man, I am another. He is simply following the footsteps of other men, and he attempts to ridicule what I have done and the imperfections which I have made in my own individual work. All I ask is, simply to take and prove whether I am wrong in laying the foundation of the work that I am doing. I have a right to my conclusions, as well as everyone else. You cannot find in the whole world two men who think alike. There is nothing which has been brought out of evolution that is more than hypothesis. I come here to show what I have. If I am wrong, I am a fraud, and am trying

to impose on you. My friend, Dr. Peirce, will grant that I have something to work on. He has already told me so. I am not abashed by my friend Patrick. I had a gentleman once take off his coat and go to work in his shirt-sleeves to upset something that I had said, but he had to accept it after all. What I ask you to do is to follow me in every line that I have given here, and prove whether I am right or wrong. When I say that I know what the organization of the first man was, I do. That gentleman has not followed me in one single line. He did not hear me speak on the subject. How can he come here and speak against it? As far as Dr. Flagg is concerned about the monkey's teeth, I say that if I cut those teeth off short, the animal will die, perhaps not immediately, but its life will be shortened proportionately. When Dr. Patrick attacks me, I do not attack him. I did not hear what he had to say. I will read it; but I could tell from his face that he was speaking against me. No man has a right to speak against me until he knows exactly what I have been talking about.

DR. C. N. PEIRCE, Philadelphia. In the absence of Dr. Patrick, I simply want to make one remark. Dr. Patrick did not come here to reply to Dr. Bonwill. Dr. Bonwill had written thirteen conclusions, and those conclusions, as Dr. Patrick showed you, were utterly uncalled for, and inconsistent with the text. I told Dr. Bonwill before he came before you, several months ago, that these conclusions could not be drawn from the text. When he made the statement that animals did not reproduce organs that were lost, he made a statement that was utterly false, and was disproven by thousands and thousands of examples in animals. Now, when he publishes this statement, he must expect to have it criticised. When he makes a statement that there has been no change in the human jaw, I ask you to look into the mouth of any patient that comes to you, and see the difference. We have what we call a monstrosity, which we wish to correct, which is a variation from the normal condition. Dr. Bonwill expects to see a sudden change. If you want to get a good idea of the change that takes place in nature, take pure water, put a few drops in one jar, and a few drops in another, and so on, all of the same kind, and you will find that there is a great difference between the first and the last jar, although they were taken from the same source.

DR. W. X. SUDDUTH, Minneapolis. In the discussion of this subject, we do not want to lose sight of one essential point. Dr. Peirce has said that Dr. Bonwill's deductions are not borne out by his observations, to the full extent; but that Dr. Bonwill has discovered a law that governs the articulation of the human teeth as

we find them at the present time, and it is a law that, taken and applied to this articulation that he has developed, gives us the best and most practical articulation that we can make for artificial dentures, so far as my experience goes. We are all, to a greater or lesser extent, specialists, and we are very apt to ride our hobbies very hard. I think in the discussion we have had here to-day that we have had as marked an illustration of this particular truth as you will ever have in your life. In several of the points where Dr. Patrick has answered Dr. Bonwill, he has, whether intentionally or not, evaded the point at issue, and discussed the question from a different standpoint. I do not think that science gains any benefit from any such discussion of papers, and I was very sorry to see Dr. Patrick take so extreme a stand as he did in answering the question. There is a principle here that will be a benefit to every dentist who will study the law and apply it in his practice as far as possible, as Dr. Haskell has testified he has done.

DR. SCHWARZE, Leipsic, Germany, then made a few remarks, approving of Dr. Bonwill's method, and saying that it was almost the same as was being followed in the universities at Berlin and Leipsic.

The Section then adjourned.

SECTION II.—ETIOLOGY, PATHOLOGY, AND BACTERIOLOGY.

The Section was called to order by the chairman, G. V. Black, M.D., D.D.S., who opened the meeting by stating that the paper under discussion in the general meeting, this morning, had been assigned to this Section, and that it would now be considered.

No one responding, the chairman stated that if any one should afterward desire to discuss the paper, it might be taken up at the completion of any subject brought forward for discussion.

Annie Felton Reynolds, D.D.S., of Boston, Mass., read a paper, of which we give an abstract.

ADENOID GROWTHS AND OTHER DISEASES INCIDENT TO PRIMARY DENTITION.

After reciting briefly and succinctly the well-known facts relating to the primary dentition, the indications of premature and delayed eruption, the bearing of different conditions and diseases upon the process and their effect upon the deciduous teeth, the paper took the ground that not difficult dentition, as held by the elder practitioners and the laity, but a rachitical tendency, is the predisposing cause of infantile convulsions, although an inflamed and tender gum may precipitate the paroxysm.

The time of dentition is a period of great functional activity, for besides the eruption of the teeth the follicular apparatus of the intestines is undergoing active development in order to prepare the system for a radical change of diet. As a consequence, gastro-intestinal disorders and nervous symptoms are frequent. The presence of undigested and indigestible food in the stomach and intestines is a very fertile cause for convulsions. Overfeeding with proper food becomes an exciting cause, especially during hot weather. Cutaneous eruptions are very common at this period of the child's life, and may appear contemporaneously with the cutting of a tooth. Salivation is of frequent occurrence in children, apart from the usual flow which accompanies dentition, and is a characteristic symptom of ulcerative stomatitis which often finds expression in gingivitis. The saliva when abnormally abundant is diffuent with flakes containing epithelial cells and mucous corpuscles, and apt to be mixed with mucus when there is much stomatitis. It is alkaline or neutral, rarely if ever acid, unless from decomposition of sugar in the mouth, and the proportion of ptyalin is deficient; indeed, up to the sixth month the infant's saliva contains no ptyalin, and therefore it should receive no starchy food.

The most important condition likely to appear at this period, and the one which to the dentist is of especial interest, is that of abnormal growths in the naso-pharyngeal cavity. That the influence of nasal obstruction is the causation not only of morbid conditions of the whole respiratory tract and middle ear, but also of pathological changes in other and remote organs of the body, is grounded on the firm foundation of every-day clinical fact and experience. The affection appears as the most formidable enemy of childhood, and one very important to detect and eradicate. It is remarkable that a disease attended by such striking symptoms should have escaped recognition and treatment until the present generation, although described by Wm. Meyer of Copenhagen twenty years ago. Adenoid growths are comb-like forms which attach to the posterior wall of the nasal pharynx, which, varying in size from an almond kernel to a grain of wheat, may be nearly sessile and be uniformly rounded; they are of a reddish color, of fleshy consistence, and very vascular. After removal, they lose their color, and appear as hard, gray, seed-like bodies. The mucous membrane seems to be free at the base of each mass, and from its pedicle. Pendent as a rule from the vault on a line with the fossa of the Eustachian tube, the growth may lie posterior to the fossa or upon the parts which are parallel to the posterior wall of the pharynx. The growth seems to spring in the main from the mucous membrane covering the locality where

connective tissue fills in the inequalities at the base of the skull, and as usually seen is pediculated, while in late childhood and early adult life broad-base growths alone are seen, which, while not creating obstructions in breathing, may excite and maintain a catarrhal state of the membrane both of the nose and of the pharynx.

The symptoms of adenoid growths may be placed under five heads, respiration, secretion, speech, hearing, and general condition. The respiratory effects are direct and indirect, the former being seen in the obstruction of nasal and the establishment of oral respiration. The general state of the patient is affected in many ways. The imperfect and unnatural breathing creates anemia, which may lead to lack of development of the bones of the face, deformities of the upper jaw, irregularities of the teeth, misshapen chest-walls, deafness, and defective speech. In mouth-breathing of long standing the superior dental arch ordinarily is contracted and the roof of the mouth elevated. In a child of two years, the average age when the trouble begins,—although the growth may be found in an infant of a few days,—little else than difficulty of breathing, especially at night, is noticed. An ordinary cold may have been the initial cause; the child soon shows a tendency to repeated attacks of cold in the head, which increase in frequency and duration, accompanied by considerable nasal discharge, which may be entirely absent when the child is free from acute attacks. Deafness, in the majority of cases, is soon added to the list of discomforts, and by the time the child has reached the age of six, eight, or ten years, the characteristics of a typical example of adenoid vegetation are as follows: The child is a mouth-breather, its facial expression is dull and stupid, oftentimes idiotic. The open or half-closed mouth is one of the most constant symptoms. Nasal breathing is interfered with during the day, but at night the child never sleeps soundly; it assumes unnatural positions in bed, the slightest noise will awaken it, and during the day it is languid and irritable. The majority of such children are deaf, and their voices are stuffy and thick. Again, nervous symptoms are sometimes associated with this disease, and abnormal sensations in the head, and pressure in the upper and back part of the cranial cavity.

Once established, some of these results remain through life; others may be removed or corrected by clearing the air-passages; all of which could have been prevented by an early removal of the growths, whereby natural and free breathing would be established through the nostrils. For an infant or child to have the nasal breathing impeded, means that it is being starved for want of

air, and the younger the child the more difficult it is for it to get air into the lungs through the mouth. There is a definite relation between these conditions and the V-shaped palatine arch, which has not been appreciated in considering the acquired causes of the irregularities of the teeth in children, and which should be emphasized. The high-arched palate always presents in typical cases of this complaint; moreover, it is one of the earliest mechanical results of obstructed nasal breathing. Mouth-breathing being unavoidable in these cases, a constant pressure of the air inside the buccal cavity gradually but surely forces the hard palate upward. From the simple vaulting of the palate in the very young it may go on to marked deformity of the jaw and great irregularity of the teeth; the central incisors suffer most, being in some instances rotated so that they stand at almost a right angle to the jaw. Many a child has had healthy teeth extracted, and has worn for months an ingenious mechanical device for correcting a crowded and irregular denture, while atmospheric pressure was constantly working against the efforts of the dentist. Whereas, if the growths were first removed the labors of the dentist would have been lessened, since the establishing of free nasal breathing would remove the atmospheric pressure, and the teeth come more easily into place. The time to operate for the removal of these growths is from the age of a few weeks to that of sixteen years, the earlier the better for the patient; the operation is not difficult, and, properly performed, is not attended by danger to the child. The growths do not recur, and after their removal the breathing at once becomes quiet and regular, the mouth remains closed, the lungs expand with the increased supply of air, and the whole physique immediately responds in a marked degree. The child, hitherto called dull and stupid, now makes rapid progress, and his comrades soon cease making a laughing-stock of him. As dentists, we have ample opportunities to diagnose this disease, which, so simple in itself, may be said to be malignant in its results, and we should realize our responsibilities in the matter, since by our neglect to cause the removal of these growths there is a risk of permanent damage to important functions, which may embitter the subsequent lives of these little ones, "no one of whom should perish."

DISCUSSION.

Dr. THOS. FILLEBROWN, of Boston, Mass., being called upon to open the discussion, said:

I have heard it prophesied for years that women were coming; it is evident to-day that women have come, and come to stay, and I am glad to respond to so able a representative as has appeared to-day.

The specialists in throat-diseases in Boston have taken up adenoids as a fad, but it is a scientific fad, and in the treatment of it much good is resulting to the community, and I am glad it is from that section that notice should have been taken of it at this Congress.

My observation of the disease has not been very great, but I am satisfied that many of the troubles we see in children who exhibit the symptoms described, and who are traveling around the streets with their mouths open, are due to adenoids, and that is the cause of a large part of the trouble, and is the explanation of why there are so many thumb-suckers. I am satisfied that it is the result of some growth of the pharynx.

I must differ a little from the speaker in regard to the causes which produce the high vault and narrow arch. I do not understand that atmospheric pressure is any more up than down. I think if you would take out a section of the palate, it would drop down and not up. Gravity tends to straighten it, and atmospheric pressure can have nothing to do with it. This is what I conceive to be the cause of a good many long and lank faces along the malar bone; going with the mouth open continually there is nothing to keep the teeth up, and it brings the weight of the teeth down on the face laterally and tends to press them together, and the high vault is not so much the elevation of the median line as it is depression of the sides. The depression of the sides narrows the arch and crowds the central incisors forward, and they must overlap; hence we have great irregularities.

The only criticism I would offer is that I believe it to be the cause of a good many other deformities that are noticed in other relations than these. I believe it has a great deal to do with the mental development of the child. There is no doubt that the physical development has a great deal to do with mental development. A sound mind in a sound body is as true now as it ever was.

DR. E. S. TALBOT, Chicago. I did not hear the first part of the paper. I have made a study of adenoid growths and diseases of the nose, etc., in relation to the development of the vault and dental arch, and I shall have to differ with the essayist in regard to the causes of the high vault, as she calls it, contracted arch, and the results of mouth-breathing. My investigations have shown that the deformed nose, including deflected septa, arrest of development of the mucous membrane, of the turbinated bones, and of the face and jaws, are all one and the same thing. That is to say, a child born of neurotic parents is either a neurotic or a degenerate, and about 50 per cent. of the people walking the streets of Chicago to-day

must be classed under one of these two heads. A person is born with a neurotic condition, and what is the result? There is an arrest of development, not of the nose, the mouth, or the jaws, but of all the tissues together. One is not dependent upon the other. The presence of adenoid growths in the nose does not cause mouth-breathing, the high vault, and the contracted arch, but they are all one and the same thing. That is to say, a person who has adenoid growths has a high vault, as we understand it, and a person who has a high vault has adenoid growths, contracted jaws, arrest of development of the face, and as a result of the arrest of development of the face and upper jaw, a deformed dental arch.

Now, what seems to be a high vault is not a high vault. In over six thousand measurements, I have found that those who have perfect vaults have highest vaults. In other words, a V-shaped vault or high vault connected with a V-shaped dental arch—saddle-shaped arch—is not a high vault, but it looks high because of the contraction. Contraction is the arrest of development. The arrest of development stops at the sixth or seventh year, and that is the reason why we have adenoid growths and hypertrophy of the mucous membrane at that time, and the deformity of the dental arch is the result of this arrest of development. We are told that at that time the brain has gotten its growth. There are three periods: First, from birth to the sixth or seventh year (I say the sixth); second, the period from the sixth year to puberty,—sixteenth or seventeenth; third, the growth from sixteen on. Now the bulk of the brain ceases to develop at the sixth year,—some earlier, some later. I do not know, nor does any one else, why the brain ceases to develop at that time,—why in the case of an idiot the brain ceases to develop at that time and why in case of a genius—a Paderewski, a Blind Tom, a Michael Angelo, and most of our great men—why their brains cease to develop. But we do know, and it must now be settled as a fact, that these conditions are noticed among neurotics and degenerates. The specialist in diseases of the nose will tell you that about fifty per cent. of his patients have these conditions: deflected septa and excessive development of the turbinated bones. I am very positive of the points I have given you in a general way.

DR. REYNOLDS. I am very glad to hear the points Dr. Talbot has given us. I did not intend to state in my paper, if I did state it, that the adenoid growths directly cause these conditions. It was simply by the retardation of the development of the whole system through the body being starved for want of air that these conditions were produced.

The next paper by P. Macarovici, M.D., Jassy, Roumania, was then read by the secretary of the Section. An abstract follows :

PULPITIS CHRONICA IDIOPATHICA.

Pulpitis chronica idiopathica is a new formation of dentine. [Translator's note, or a dentine neoplasm.] This pathological process arises in three ways. 1. By the proliferation of one or several cells of dentine-tissue, forming a nodular growth which exerts pressure upon the nerves of the pulp. These nodules are situated on the inner wall of the pulp-chamber.

2. By a sort of obliteration of the pulp-chamber whence the pulp beginning at the periphery is transmitted into secondary dentine; the change commences at the portion adjacent to the crown, which at the same time becomes continuous with the dentine and extends downward to the root portion of the pulp. This pathological process is more frequently found in teeth which are worn down, or such as have become carious.

This new formation at times becomes so extensive that it forms an axis in the center of the pulp, which sometimes grows to such a degree of thickness that it reaches to the walls of the pulp-chamber, to which it then becomes adherent, so that the entire pulp becomes transformed in softer dentine than the normal and entirely obliterates the chamber. This was already known to the older surgeons. (Bertin, Hunter, etc.) Such creations are usually to be found in teeth affected with a low degree of inflammation. (Witzell, "Antiseptic Treatment of Diseases of the Pulp," 1879; Wedl, "Pathology of the Teeth," 1870; Bruck, Jr., "Contributions to the Histology of the Teeth," etc.)

3. By a new formation, having its origin in the pulp itself, and not connected with the walls of the chambers, but free either in the center or at the periphery of the pulp. (Salter, Bruck, Arkövy.) This occurs rarely in teeth whose cusps are entirely unaffected.

Bertin was the first to observe that these new formations are of two kinds, an *adherent* and a *free* species, and he was hence the forerunner of Salter in his discourse, in that he made it easier for the latter to prove that these new formations of dentine are the result of a *pathological process*, although Bertin had described them only from the standpoint of anatomy. Bertin says: "The pulp-chamber is not altogether an empty cavity, but it is rather filled with a soft mass which arises from the lymphatic fluid, and which becomes denser, but without reaching the hardness of the bone. This substance frequently forms a firm mass, which in the beginning does not communicate with the rest of the tissue, but becomes united to

the dentine later (to the wall of the pulp-chamber). (Blondin, in the *Zahnarzt*, 1848, p. 147; *Deutsche Vierteljahrsschrift f. Zahnheilkunde*, 1882, p. 167.)

The older surgeons regarded this diseased condition of the teeth as normal.

According to Hyrtl, ossification of the pulp, or deposit of phosphoric or uric-acid salts, is the cause of the obliteration. (Hyrtl, *Anat.*, 1875, p. 599.)

Wedl has shown that such obliteration depends upon concretions deposited in the adventitia of the vessels; Arkövy is of the same opinion. ("Diagnosis," 1885, p. 98.) M. Heidert and C. Wedl state that M. S. Ryding has observed the formation of dentine in healthy teeth also. They themselves have noted such formation in milk-teeth whose roots have been absorbed at the period of the second dentition, as well as in carious teeth. (*Deutsche Vierteljahrsschrift*, 1864, p. 97; Wedl, "Pathology of the Teeth," 1870, p. 232.) J. Bruck, Jr., says that he has found dentine formation in healthy milk-teeth with unabsorbed roots, and also in healthy permanent teeth, and adds that the size of the concretion was equal to a mustard-seed. (Bruck, Jr., "Contributions to the Histology of the Teeth," 1871, p. 2.)

I have myself observed a single instance of such formation in a permanent apparently healthy tooth, not worn at the crown nor not carious. The size of the new formation was equal to hemp-seed.

Madame G. had been treated for a number of years by physicians of Jassy for attacks of headache, extending to one side of the face. The treatment was ineffectual. During Easter she noticed that the pain began at times in a tooth, whence it spread to one-half of the head and face. She said that until one year ago the pain occurred on her making rapid movements, if she stamped her foot or shook her head; as long as she remained still, it did not occur. At that time the attacks were of short duration, and ceased suddenly. Latterly the attacks came on without being excited by any more violent movements; the pain was much more severe, and its duration longer. Happily it still vanished suddenly, and allowed her periods of rest. Examining each of the teeth in every possible way did not reveal a single carious tooth; even irrigation with cold water revealed nothing. Only on the left side of the upper jaw a little tartar was seen adhering to two molars.

I therefore treated the case on general principles. She carried out my instructions for four successive days, but without result.

I thought of the possibility of the presence of new formation of dentine in teeth with enamel intact. I noticed that the first left

upper molar differed in color from the other teeth. I tried massage of the upper lip according to Arkövy's method, and the patient testified to the pain by a loud cry.

On closer examination of the suspicious molar, I was enabled to discover that it was very slightly movable; this movement could only be detected with difficulty. The patient having become disgusted with the numerous plans of treatment already pursued, declared herself ready to sacrifice all her teeth, if need be, if she could only be relieved of her terrible malady. Accordingly I extracted the left upper molar (the suspected tooth), with the most gratifying result; from that day to this the lady has been entirely free from all suffering. The tooth had three extensive roots in a state of partial absorption. The gingival root was 7 mm. in length, as was also the mesial root; the distal one being 5 mm. long. On section, I found that the pulp had become ossified; on the gingival aspect of the crown a little fluid was noticed, while the ossified pulp itself remained in the chamber of the crown and of the two labial roots. The ossified mass was not in contact with the wall of the chamber, but a small space, hardly visible, intervened between them. The latter contained a little yellowish-white fluid (the unossified pulp), and the pulp was only attached by its projections, which extended into the canals of the roots. The color of the new formation was yellowish white with a sheen of mother-of-pearl; it was of irregular form, with several angles. Its size was that of a hemp-seed.

According to an analysis of Hoppe-Seyler, the enamel of a newborn child gave 15.59 per cent. of organic substances. The enamel of the adult contains only 1.3 per cent. of organic matter.

The dentine-fibers or fibers of Tomes are normally, so long as they are secluded from contact with the atmosphere, in my opinion, nothing else than lymph which is derived from the pulp, traverses the dentine canals, and also penetrates into the enamel; they serve for the nutrition of the dentine and enamel, and partially also for that of the cement, where they may be regarded as auxiliaries of the alveolar periosteum. This fluid has the property of becoming solid on contact with the air, being fluid only while in transit from the pulp to the enamel through the canal of the dentine. At the instant of contact with the atmosphere the fibers of Tomes solidify at their superficial extremity, forming an elastic membrane provided with minute pores, which allows of the transudation of a small portion of the still fluid lymph, and which in cases of fracture of the tooth serves for the formation of the callus. If the solidification proceeds until finally the pores are obliterated, such solidification involves the entire extent of

the fibers from their peripheral termination to their origin in the pulp.

It is my firm opinion, and it is shared by several authors, that the inner wall of dentine looking toward the pulp and surrounding the same, continues to grow after development of teeth is complete, and that hence hyperemia brought on by intense emotion, violent movements, and other causes, may from the mineral substances contained in the blood bring about a hypertrophy of the dentine which causes a narrowing of the canals of the dentine at their mouths in the walls of the pulp-chamber, and thus interferes with the entrance and circulation of the lymph (fibers of Tomes). The mineral substances are thus retained in the pulp, where they undergo evolution into dentine, cement, and enamel, which are intermingled, or else unite in groups of one or several homologous cells. This process has been verified by the observations of several authors, who state that they have found enamel, dentine, and cement in the new formation.

Notwithstanding the fact that lymphatic vessels have not yet been shown to exist in the pulp, it is nevertheless certain that lymph must be present in the pulp.

This theory of the fluid nature of the fibers of Tomes is substantiated by the formation of callus after fracture of the teeth. From whence comes this callus if not from the secretion of plastic lymph? And if the fractured portions of the crown contained no fluid in themselves, how could the lymph which is supposed to come from the pulp unite the fragments, which would in this case be toward one another as foreign bodies?

This theory also explains the great sensibility which exists on touching with a pointed probe a point in the line of junction between the dentine and the enamel, whereas the sensibility is much less at any point of the dentine itself. The hyperemia which may be the cause of an inflammation of the pulp, determines the place of the dentine-formation. If, for instance, the inflammation is intense, the entire pulp is implicated, and the concretions come to be free in the chambers, and are of different size and form. If the inflammation is less intense, it becomes limited to certain parts of the pulp, only the apex or the lateral walls. In these cases the mouths of the canaliculi only are narrowed which correspond to the site of the inflammation, and the newly-formed dentine is deposited in that spot and forms a mass in connection with the fibers of Tomes as well as with the dentine-canals. This is the origin of Salter's secondary dentine.

Such secondary dentine is also found at times in caries of the teeth.

DISCUSSION.

DR. GREVERS, Amsterdam, Holland. In opening the discussion of the paper we have just heard, I must confess that I am somewhat disappointed. The first thing that struck me was the absence of any reference to the work that has been done by the Odontological Section of the International Medical Congress held in Berlin in 1890, where the subject was treated by Drs. Weil, of Munich, and Hames, of Amsterdam. No reference has been made by the essayist to the new name that has been adopted for the hard formations in the dental pulp, as suggested by Prof. Islay, of Buda-Pesth, viz., *odonthele*. It certainly would have facilitated discussion, as there is a difference between *odonthele* and the hard concretions as found in the dental pulp. We even miss a differential diagnosis, and very little is said about the subjective symptoms of the disease. Now, it is well known that when there is pulpitis present with the hard formation, the patient is highly sensitive to thermal and chemical changes; even cold air produces a paroxysm of pain. Very often the tooth shows no pathological changes whatever. The only thing that strikes a slight observer is a slight recession of the gums at the labial, buccal, or palatine surfaces.

I regret, Mr. President, that my remarks cannot be more favorable to the essayist.

There being no further business, the Section adjourned at 4 P.M.

SECTION III.—CHEMISTRY AND METALLURGY.

Dr. E. W. Rockwood, of Iowa City, Iowa, read the following paper:

THE STUDY OF CHEMISTRY IN DENTISTRY.

The statistician who included dentistry in the mechanical trades called forth a storm of dissenting opinions from those who were laboring to advance this department of medicine; but as we consider its present status, we may ask ourselves whether there may not have been, after all, some reason for the prevalence of this view of the profession. The question, of how dentistry may be brought to and kept upon the same plan as medicine or law, is of evident importance. The difficulties are, in many cases, enhanced by the dental student's lack of preparation. He frequently comes to the professional school with only a common school education, and sometimes with hardly that. His mind is not well disciplined by study, and his powers of observation have not been trained. A trade may often be learned with little cultivation of the perceptive faculties or pow-

ers of reasoning. A profession can never be mastered without the highest exercise of both. A man who works by rule of thumb without concerning himself about the reason for the rule cannot attain to the highest success.

The study of chemistry leads a student to observe carefully, and then to draw conclusions from such observations. He can thereby understand better what the results mean, and why he performs certain operations. Of late years more importance is placed, and rightly, upon the practical, or laboratory, courses. It is not now deemed sufficient for a professor to describe and experiment, the student must perform it for himself. A certain amount of didactic instruction is necessary. The terms used must be given, the general principles of the science must be explained, and the methods of the work described. Then, too, some experiments are too difficult for beginners to perform. Hence lectures and recitations cannot be entirely replaced by practical work, but the latter should occupy a prominent place. It is true that the dentist cannot usually hope to become a trained chemist, but that is no more reason for his neglecting chemistry than for not studying the nerves and arteries of the head because he does not expect to be an anatomist. Many points important for a chemist may be passed over rapidly, and many which are of importance to the physician will not especially interest the dentist. The fundamental principles, however, should be clearly understood, and then as extended application made of them as possible. The beginner is apt to think after a few months' study of the subject, that he can never obtain satisfactory results from his labors because of the vastness of the field. He must be made to see that, having mastered the fundamentals, he will be in a position to apply them intelligently in his work, and that the liability to failure is greatest when the principles are least understood. This includes not only the common chemical tests, but all the operations where chemical action is involved.

Work in the laboratory should commence as soon as possible. There the learner becomes familiar with the action of reagents and with the various manifestations of chemical force. His hand is trained in the manipulations necessary for a successful experiment. He becomes acquainted with the common terms of the science, such as acid, base, and salt, by handling and testing these. He learns by experience the methods of preparation and properties of many of his materials, like nitrous oxid, chlorin, and peroxid of hydrogen. The metals and their compounds offer a wide field for study. By the use of the blow-pipe the changes are noted which are produced

by the influence of heat, as well as the action of fluxes. The effect of the oxygen of the air upon the metals at different temperatures is also learned. Experiments should also be made by treating the metals with common acid and alkaline solvents. By these are shown the effects likely to be produced in practical work by the contact of the metals with such liquids. Having obtained by these methods solutions of the metallic salts, these may be tested singly by the ordinary reagents, then from these single tests the methods may be deduced of separating them when several are present, and thus the student becomes acquainted with the analysis of alloys and the processes employed in the refining of metals. An understanding of the manufacture of alloys, such as are used for solders or amalgams, and of amalgams themselves, is necessary, and in this connection, if not in the chemical laboratory, not only the chemical, but also the physical properties should be studied. The changes in the properties of a metal by impurities, or of an alloy by varying the proportions of its constituents, may be demonstrated here. Unless there is a separate course of instruction in physics, some regard should be paid to electricity and the electrical effects produced by the contact of different metals.

It is a prevalent idea that the branch of chemistry commonly spoken of as organic is too complex to be mastered by one who does not make a specialty of chemistry, and, if by mastering we mean a knowledge of all its numerous compounds and their transformations, this is true. However, to gain an understanding of the changes which take place in living tissues, it is necessary to be familiar with some of these. The subject of fermentation is one which should be of interest to the dentist; and laboratory experiments will illustrate some of the most common forms, alcoholic, lactic, and butyric, and show the substances produced by the process. In connection with these simpler forms of fermentation, the putrefactive changes can be shown, with the action of different antiseptics and their comparative powers of checking the growth of organisms which are the cause of putrefaction. The chemical action of each of these antiseptics must be clearly held in mind in order to be able to judge their suitability in particular cases. The same might be said of deodorizers and disinfectants.

Many points in physiological chemistry can be practically demonstrated in the laboratory. A complete analysis of tooth-substance should, of course, be made, and the properties of its constituents examined, not only as obtained from the tooth but also in the pure state. A thorough course should be taken in salivary analysis. This is as essential for the dentist as one in the urinary analysis for

the practitioner of medicine. The normal constituents should be isolated, and a sufficient number of pathological specimens should be tested to gain a working knowledge of the subject. The dentist should certainly be able to determine whether a case of ptyalism is caused by the iodid of potassium, or some compound of arsenic or mercury.

Many of the common medicinal agents are chemical compounds, some of them being administered for their chemical action, but all of them capable of acting chemically upon other substances which may be put into the same prescriptions. How many a prescription is rendered inactive or positively harmful by an improper choice of its ingredients. It is true we can go to our books and find the necessary formula, just as we could consult our libraries to learn the proper course of action if an artery has been cut, but these fundamentals should be learned, so that they may be immediately available when they are needed. Such a knowledge can only be attained through the familiarity with such substances which comes from personal observation. This might also be said of the poisonous medicines and their antidotes, the latter owing their efficacy, for the most part, to their chemical properties.

Some work in quantitative analysis will greatly aid in the comprehension of chemical principles. If the time is limited it may be confined to volumetric determinations, such as the acidity or alkalinity of solutions, for example, the saliva, also the amount of peroxid of hydrogen in solutions as purchased and the percentage composition of the common alloys. These are more easily performed in many cases than the determination by weight. At the same time, gravimetric methods should also be employed.

But, after all this, which we may term the foundation of his chemical education, the dentist needs something more. He must not only be able to progress in the deeply-worn ruts of his predecessors, but, if need be, to hew a new path, if he can shorten or make easier the way. If old methods are faulty, they should be supplanted by better; if they are insufficient, they should be improved. This can often be done only by an understanding of the principles of chemistry. The professional chemist might furnish this, but he is ignorant of the needs of the dentist. The dental chemist who is thoroughly acquainted with both professions is rarely met with. Improvements must come largely either from the dental profession or from the manufacturer; the former is often unable to furnish them, and if they come from the latter they are immediately covered with patents. One aim, then, to be attained by a dental education, as in others which fit men for practical life,

is to give such training as will enable a man to improve existing methods and invent new ones. I am aware that many will say that there is not sufficient time in the ordinary course for such studies. This is a forcible objection, it is true, with the time at present at our disposal. We should, however, look ever forward toward better things. When the term of study is lengthened, as it must be to keep pace with the advances of the science, we shall be able to attain nearer to our ideas of perfection than we now can. But we must remember that we have not yet attained it, and be ready when the opportunity for advancement presents itself.

There are many subjects connected with the profession which need to be investigated, and which can be intelligently investigated only by one who has a knowledge of theoretical points as well as practical needs. For a student these researches should be confined to some limited field. Questions are arising daily which need to be answered by research. It is perhaps needless to refer to more than a few of them. New remedies are being continually recommended, or quite often old ones or combinations of old ones under new and awe-inspiring names. What is their composition? Is their action chemical? Will it probably be beneficial or injurious? The decay of the teeth should be better understood. What produces favorable or unfavorable conditions? What is the action of the many disinfectants in use? and when should the different ones be employed? Do the sulphids or oxids of the metals which may be formed on amalgam fillings influence the decay, and if so in what manner? No one who is conversant with the many substances employed for cements and fillings believes that perfection has been reached in this line, even if he is able to use them all skilfully. The perfect filling is yet to be discovered. There is also much to be learned of the alloys. Do the metals cause an electrical action when the amalgam has set in the tooth so as to hasten or prevent its decay? The study of influence of small quantities of a metal upon alloys needs investigation. Do the minute amounts of gold and platinum often used—one-tenth to three-tenths of a per cent. for instance—have a decided effect upon their properties? Tests should be made to determine the best combination, and the proper proportions of these in dental alloys. There is a field for observation, too, in the action of the mercury contained in amalgam fillings and in the coloring matter of plates, as to its state, and whether it produces the effects often ascribed to it upon the tissues of the mouth. Every dental practitioner can furnish queries from his own experience, and it is needless to give others. Their number is practically limitless.

As we see the work in chemistry which is being done in some of our dental colleges, I think we can conclude that its importance is becoming better appreciated, but there is still room for improvement. There is no reason to doubt that in the future it will occupy a prominent place among the studies which will best fit the dental student for his professional work.

SECTION IV.—THERAPEUTICS AND MATERIA MEDICA.

The session of this Section was commenced at 2.30 P.M., Dr. F. J. S. Gorgas, of Baltimore, in the chair.

The first paper on the list, upon the subject of "The Method of Inducing Local Anesthesia by Cocain," in the absence of the author, D. Caracatsanis, M.D., Athens, Greece, was read by the chairman, as follows :

METHOD OF INDUCING LOCAL ANESTHESIA BY COCAIN.

You are all acquainted with the danger of cocain injections for the painless extraction of teeth. Its narcotic effects are surprising, but unhappily they are frequently followed by untoward consequences; even loss of life has occasionally resulted. At the Dental Congress in Paris, animated discussions arose on this subject. Since then I undertook some experiments to determine whether some procedure might not be substituted for injection, some milder method for the induction of local anesthesia by means of cocain.

I proceeded on the basis that if its effects could be completely localized, cocain would answer perfectly. Such a method I have found; I have applied it practically for several years. The patients have nothing to complain of, not even the slightest indisposition. Accordingly it is with the greatest confidence in my method that I lay it before you. The operation is simple, within the power of every one; its only imperfection is that its application demands considerable time; sometimes as much as three-quarters of an hour is required for complete anesthesia. The procedure is as follows: I begin painting the gum, next the tooth to be extracted, with a steel instrument wrapped in cotton dipped in a solution of phenic acid, 2 to 1000, which I have heated. This is followed by the application of the salt of cocain by means of a pledget of cotton impregnated therewith. As soon as the gum shows signs of insensibility, I commence to separate it slowly from the tooth by means of a bistoury. I insert into the space thus effected pledgets of cotton impregnated with cocain as before. As the anesthesia advances I enlarge the opening to a depth of about one centimeter, on the buccal as well as on the lingual surface. I direct the patient to ab-

stain from swallowing the saliva, to avoid all absorption of cocain. I take good care not to forget the cotton pledgets placed between the gum and the tooth.

After assuring myself by strongly making pressure on the parts with a steel instrument, I have my assistant to spray the parts with a mixture composed as follows:

Chloroform, 25 grams;
Sulphuric ether, 40 grams;
Menthol, 3 grams;
Cocain, 1 gram;
Essence of mint, 1 gram.

I extract while the parts are being sprayed. The resulting anesthesia is absolutely complete; the only condition in which I have failed to produce it being the existence of inflammation or periostitis.

To convince you thoroughly, I am prepared to make the experiment with my method before your honorable Congress.

DISCUSSION.

DR. ROBERTS. Foreign dentists have been experimenting with a new preparation called tropacocain. It is rather expensive, costing 20 cents per grain. The tropacocain, in about a two per cent. solution, combined with an antiseptic, gave better results than cocain in four per cent. solution, without any of the disturbance that cocain sometimes produces. Some of the foreign journals had given a number of experiments by members of the different foreign faculties, and my experiments tallied with theirs, though not so extensive. Tropacocain is far superior to cocain for hypodermic injections, producing longer and more thorough anesthesia without symptoms, practically. Of course, if it should be used in very strong doses, as in four, five, and six per cent. solutions, it would produce an effect, but there seems to be no toxic effect from a two per cent. solution.

DR. SEYMOUR. About six or seven years ago, I experimented with cocain and carbolic acid, in the proportion of two to one in combination, and in the course of ten minutes I could extract the tooth without any perceptible pain. I used two drops of a twenty per cent. solution of hydrochlorate of cocain and one drop of Merck's carbolic acid, simply as a local application for from five to ten minutes, by means of pledgets of cotton.

DR. ROBERTS. Is it not a fact that from a two to four per cent. solution of cocain, properly antisepticised with chloral perhaps, in a certain proportion, is practically safe if it is properly applied? It is a

fact so far as my own experience is concerned, in probably two thousand or three thousand extractions, that it is absolutely instantaneous.

[Dr. Caracatsanis was here presented to the members, and again read his paper, and further discussion was postponed until the reading of the next paper.]

In the absence of Dr. Anthony Bleichsteiner, of Graz, Austria, his paper on "Cocain Injections for the Production of Local Anesthesia" was read by the chairman, as follows:

COCAIN INJECTIONS FOR THE PRODUCTION OF ANESTHESIA.

Under this same title I presented in the year 1889 in Paris, at the "Congress Dentaire International," the results of my experience with cocain injections for the purpose of painless extraction of teeth. Up to that time I had more than three thousand injections with five per cent. solutions of cocain hydrochlorate. To-day I shall speak about the experience I have collected in executing more than fourteen thousand injections. I shall give you a description of:

1. The preparation I use.
2. The character of the solution.
3. What quantities of cocain hydrochlorate have been used and for how many injections.
4. My syringe.
5. My method of injecting.
6. My opinions concerning the intoxications following cocain injection.

In December, 1886, I made the first trials with cocain hydrochlorate (Merck). I began with 20 per cent. solutions. After several trials I diminished them to 10 per cent. solutions. After 1887 I used 5 per cent., but since March, 1892, only 3 per cent. solution.

At first I renewed the solution immediately before every injection, but when I came to execute every extraction with cocain anesthesia, I prepared the cocain solution in quantities of ten grams fluid each, and I used for the sterilization of the solutions, corrosive sublimate. I took ten grams of sublimate solution, containing one gram of sublimate to five thousand grams of distilled water, and dissolved in it five decigrams as long as I used 5 per cent. solutions; now I dissolve in ten grams of the same sublimate solution three decigrams of cocain hydrochlorate, by which I obtain a 3 per cent. solution of cocain hydrochlorate. A drop of this solution contains three milligrams of cocain hydrochlorate.

In the manner previously mentioned since the year 1887, I have used six hundred grams of cocain hydrochlorate (Merck) exclusively for injections, and according to calculation I have made fourteen thousand injections with it.

Four hundred and fifty grams were used for 5 per cent. solutions until the end of March, 1892. From that time up to the present day, one hundred and fifty grams of 3 per cent. solution have been used, which make five thousand grams injection fluid of 3 per cent. Nine thousand and five thousand are fourteen thousand grams of cocain solutions (or fourteen litres), with which by exact calculation from the year 1887 up to this date, sixteen thousand injections with cocain have been applied.

I used the "Pravaz" syringe only for a short time for the injections. My syringe as now constructed consists of a glass cylinder incased in hard rubber; its pipe is S shaped, and in such a way that the prolongation of the end of the pipe forms with the prolongation of the axis of the glass cylinder an acute angle of twenty to thirty-five degrees. The piston-rod of the syringe is divided into ten parts, so that one stroke discharges one decigram of fluid or a drop. The injection needles have different lengths, ten and twenty millimeters respectively, in order to be able to adapt them more easily to the different dimensions of the upper and lower jaws. Their sharpened ends are as short as possible, about two millimeters, therefore the length of the puncture can be very short, which is most advantageous. On the handle of the syringe there are two projections for the forefinger and middle finger.

I will now mention my method of quickly preparing the solution of ten grams of injection fluid. I have vials with a wide neck, which will contain ten grams of fluid, exactly. The vial is filled with the sublimate solution already mentioned, 1 to 5000. I now add three decigrams of cocain hydrochlorate, which is weighed in paper cases. By shaking the solution it is made ready for use in a few seconds. The filling of the syringe is done by dipping it without the injection needle into the solution, and then pulling the piston-rod.

I inject only into the gums near the tooth to be extracted, and I always try to maintain the injection needle parallel with the curve of the jaw. This is very important, for if I direct the point too much against the epithelial side the uppermost layer of the epithelium is lifted up by the slightest pressure on the piston-rod, in the form of a transparent blister. Such injections are of no value at all. But if I put the needle too much toward the jaw, then I discover that I have struck the socket. I may press as long as I

like and not get anything out of the syringe. The piston-rod remains immovable, and in trying to overcome the obstacle by forced exertions either the piston-rod or the glass cylinder breaks, as I have sometimes experienced. I must therefore hold the syringe after the manner of a writing-pen, and force it between the periosteum and the socket. At this place the injection fluid is pressed by the tension of the periosteum into the bone-tissues of the alveolar wall, and from there into the periosteum. The injection proves to be successful by the gums growing more and more pale, and the formation of a transparent circumscribed blister, which resembles very much a ranula swelling.

Four horizontal and four vertical punctures of one drop each, generally suffice. At the mesial labial papilla of the gums I also inject two or three millimeters distant from the gums, pricking toward the distal-labial edge. If the injection has succeeded well after the first horizontal puncture, of which the growing paleness of the gums is a sure criterion, the next puncture being made in the pale place, it is not felt by the patient. In this second puncture the needle is again moved in the direction of the distal-labial edge of the gums, and after another injection has been successfully made, the whole labial surface of the gum will have grown pale, perhaps including even the two edges of the gums, mesial and distal from the tooth. In the same way I prick the lingual edge of the alveolar wall, first horizontally from the mesial-lingual edge of the gums, and then again within the reach of the pale spot resulting from the first injection. The punctures and their effects must be continually controlled by means of the mouth-mirror, and the growing paleness of the gums must be carefully observed. If during the injection considerable of the injection fluid should flow back along the injection-needle, then the injection must be immediately interrupted; a new puncture and new injection must be made a little distant from the first and in another direction. In order to avoid swallowing the cocain solution, which may have flowed back, and the anesthesia and paresis of the uvula connected with it, which usually causes a tendency to vomit, I make the patient rinse his mouth immediately after every puncture, and only then do I continue the process.

If, by the horizontal punctures, the gums grow pale all around, then I proceed to make the vertical or the parallel punctures longitudinal to the root or roots of the tooth. I generally make four of them, successively; first the labial-mesial, the labial-distal, then the lingual-mesial, and the lingual-distal puncture. Especially with the lingual-vertical punctures the assistance of the mouth-mirror is indispensable. At every puncture parallel to the length of the

tooth the patient is immediately asked whether he feels the puncture, and only in the affirmative case shall the injection be effected. If in case all four vertical punctures have been still felt, the injection must be every time vertical, then it is desirable to make a few more vertical trial-punctures in the immediate space between the places where the punctures have been made, in order to be quite sure that all around the socket of the tooth to be extracted there is no sensitive place to be found for the needle. If a difficult extraction is foreseen, I inject also the septum of the gums between the adjacent teeth in the form of vertical punctures. I have now thoroughly distributed the injection fluid all around the socket. The length of the horizontal punctures should not exceed five millimeters, while the vertical punctures shall be made as long as possible, at least above ten millimeters. Many authors advise to wait from five to ten minutes after the injection has been made before extracting the tooth. I consider this superfluous for the anesthesia, and I extract immediately after the injection, and to this proceeding I ascribe the circumstance that I have had to experience comparatively very few and very slight accidents.

Intoxications after cocain injections only occur in my experience if of 20 or 10 per cent. solutions half or even a whole syringe-ful has been injected. In this case, if the solution be twenty per cent., either one decigram or 2 decigrams of cocain hydrochlorate has been injected; but with ten per cent. solutions, five centigrams or one decigram of cocain. These are doses which are too high under all circumstances. I only had instances of real intoxications in the beginning of my cocain injections, and as long as I injected such doses. I then found the following symptoms: Dilated pupils, dryness of the throat and mucous membrane, tendency to vomit, a feeling of giddiness, tingling in the ears, a slow pulse, which could easily become pressed and stopped, cold perspiration on the forehead and face, on the hands or over the whole body, a high degree of anemia of the face, etc. In particularly alarming cases, interruption of the sensory function, lethargy, decay of the bodily strength, and collapse.

I have in the beginning often mistaken for intoxication, hysterical paroxysms or even apoplectic fits. My further experience has taught me to distinguish exactly the intoxications from these nervous fits. When, after proper treatment, the alarming symptoms had been overcome, I asked the patient himself or the companions that had accompanied him to my house, whether this kind of fits had made their appearance at certain intervals or occasions, and my question was always answered affirmatively.

I have found few reasons to believe in these fits as the consequence of the procedure, and have almost always been able to range the respective description into the series of one of the reflex symptoms already mentioned. Since I have used three per cent. solutions, the accidents described answered more the species of reflex actions. I have rarely injected fifty milligrams—that is, the whole contents of a syringe—and it may be that at one or another time too little was injected, and so with very nervous persons these nervous spasms may have been caused by a feeling of pain from the extraction. That feelings of pain with nervous persons can be the cause of the reflex symptoms has often been proved. I remember a case when three sound and firmly-fixed teeth were extracted for a very nervous elderly lady at one sitting. After an injection of two syringes and a half of a five per cent. solution, one hundred and twenty-five milligrams of cocain hydrochlorate, not the slightest bad consequences were to be noticed. Two days later I wished to remove a very loose root of a central incisor for this same lady, and I injected only two drops of five per cent. solution, that is to say ten milligrams. After extracting she fell back in the chair and her face lost its color, followed by convulsions of the muscles of the face, the arms, the legs, and of the trunk. The color of the face changed alternately from paleness into redness; clonic spasms passed gradually over to tonic spasms, by which the muscles of the bottom of the cavity of the mouth were especially violently seized. After this kind of spasms had set in, a secretion of perspiration was to be observed. The sensory function was annulled for a short time; the pulse grew slight and could easily be compressed; the respiration became short but frequent. By a horizontal position, cold poultices applied on the forehead as long as the clonic spasms lasted, loosening of the dress, and doses of cognac, as well as making her swallow ice-cream, she was finally able, after an hour, to sit up a little. The first words she uttered were: “Why, Doctor, what pain you have made me suffer. I cannot bear any physical pain at all! Only injuring my finger with a needle, I am sure to be attacked by spasmodic fits.”

Taking in consideration that two days before one hundred and twenty-five milligrams of cocain hydrochlorate had been applied with the best result imaginable, and that ten milligrams of cocain hydrochlorate produced, two days afterward, such a bad effect, the conclusion is easily justified that the symptoms of spasms were not caused by the doses of cocain hydrochlorate; the more so as the lady herself informed me of her being subject to hysterical paroxysms. Before anything was known of nitrous oxid and cocain

I noted numerous syncope, hysterical fits, and similar nervous reflexes. Now, when using only three per cent. cocain solutions, I have but rarely perceived reflex symptoms, never real intoxications.

One must be careful that with very timid and nervous patients the first puncture does not excite them, which can be avoided by brushing the gums with cocain before the injection is applied and that the first puncture is made very gradually, though as quickly as possible; and after very little of the fluid, not even a whole drop, has been injected, the needle is pushed on a little farther, upon which a greater quantity can be injected at once. With persons of nervous disposition, the dentist must try to quiet their excitement by showing himself perfectly composed and at ease in order to gain their entire confidence and trust. Having thus succeeded, the whole procedure may be properly executed. With a three per cent. solution one can only experience nervous reflexes, which, however alarming they may seem, have nothing dangerous in themselves.

DISCUSSION.

DR. ROBERTS. A year or two ago, when the local anesthetics were being advertised all through the country, I gathered all I could get hold of together and had them analyzed, and I found that they were all composed of from one to three per cent.—sometimes five per cent.—of cocain with other drugs in combination, and this paper just read bears out my own experience in testing cocain. The majority of the combinations that we had were antiseptised by means of carbolic acid. Experimenting with them clinically, I found that a great majority of them contained too much carbolic acid, and unless the gums were thoroughly lanced and bleeding ensued, there would be either sloughing of the gums or necrosis of the process in a little while. I have had one or two of the combinations recently offered analyzed, and found a small per cent. of tropacocain (one-half of one per cent.) in some of them, consequently they are recognizing the fact that it is a superior drug for that purpose. I find two per cent. of cocain does just as much good as four per cent. In injecting the cocain or any drug into the gum, it should be injected in a direction which would force the blood away from the extremity of the capillary, so that it will go forward. If you commence to force the other way, your cocain will back up into the capillaries and you cannot get that perfectly white appearance. If you commence parallel with the top of the gum and direct the injection toward the blood-centers, you will get tissue perfectly white, and absolute anesthesia will follow instantly. The main thing now is as to the effect of the different antiseptics in connection with

cocain, because I consider it absolutely settled that a two to four per cent. solution of cocain will do the work harmlessly.

DR. PRUYN, Chicago. I made a long series of experiments with cocain. When cocain was first brought into notice, I began to use it locally within the cavity of the tooth, thinking that possibly some good results might follow, as we heard from the experience of the gentleman from abroad that it had such wonderful effects on the conjunctiva. Of course results were nil, and I gave it up for a time, and then commenced experimenting with the use of cocain hypodermically. I think it is five years since I presented a paper at the twenty-fifth anniversary of the Chicago Dental Society on this subject, giving the result of some five hundred cases in actual practice; also of a large number of experiments upon the lower animals. At the time little had been said and written upon the subject, and I was fearful of entering upon any serious experiments upon the human subject until I had assured myself by experimenting upon the lower animals; so I sacrificed dogs—many of them—for that purpose. I wanted to know what the results would be if by any means an overdose should be given, and what I should do in a case of cocain poisoning.

This series of experiments I give now every winter in our college before the medical and dental class. As a rule I take twelve dogs, and pair them so that I have two of about the same size, general conditions, form, and breed, so that there would be the least possible difference between them, then I take one of the dogs and inject cocain enough to kill him. He then goes through all the usual toxicological effects. The other dog is fortified with an injection of morphia, and to him I give just as large a dose of cocain and invariably save his life. The dog without the morphin as an antidote dies a very hard death. Cocain paralyzes the centers of respiration, the breath is shut off, the animal struggles to breathe, and goes through tetanic symptoms with paroxysmal exacerbations. For a moment or two he will struggle for breath, and then there will be a cessation, followed by another exacerbation, until finally he goes off into a tetanic spasm.

A case in practice may be of interest. Just a year ago I took my little son, a lad of ten, to the office of a rhinologist for treatment of the large turbinated bone for some catarrhal trouble. This gentleman was one of the ablest in his profession in Chicago, who used cocain recklessly, we might say, upon the tissue of the nose. They do not use it just as we do, but by swabbing a ten per cent. solution into the nose. Then when they have produced sufficient

anesthesia, they operate with the electrical cautery. I went with the lad, and at about half-past ten in the morning they applied the cocain, and he instantly dropped to the floor. We applied artificial respiration, and in a few minutes he recovered.

Nothing further was done then, but about a week later I went again, and having heard that coffee had been used as an antidote I gave the boy a cup of strong coffee, and, not being accustomed to it, he of course felt the stimulating effects to a considerable degree. We went to the office of the doctor, who applied the cocain just as he had before, in even a stronger solution, and the lad went through the operation with no toxic symptoms whatever. One side only was operated on then, and a week later I took the boy the third time, but did not fortify him with coffee, and after the operation no effect was noticeable until he walked about a block on the street, when he began to be troubled with his breathing. I laid him upon the floor and applied artificial respiration, working with him for about an hour, he having all the time these paroxysmal exacerbations. In this case coffee seemed to be an antidote, as the success of the second administration of the cocain can be attributed to nothing else.

In actual practice, a two per cent. solution with about a half per cent. solution of salicylic acid to preserve it, answers just as well as a four or six or eight per cent. solution.

The writer of the paper spoke about calmness upon the part of the operator being a prerequisite to success in the use of cocain. There is no doubt about that. Cocain makes a person very fearful, and if there is any trepidation shown upon the part of the operator, that feeling is conveyed at once to the patient, and he suffers needlessly.

I have used in some cases hot water simply, thinking that possibly there might be something in the pressure of the liquid of the solution of cocain upon the terminal ends of the nerves that had something to do with obtunding, and it has done wondrously well. I dare not say it is just as good as cocain, but in the few cases I have used it, it has proven that it is worth something. I would like those who are experimenting in this line to try it, and find if we can get any results from it.

DR. CHENEY. I have tried tepid water numerous times, and find it very effective. If the patient does not know the difference, it is just as good as cocain.

DR. PARKER. Isn't that a hypnotic effect? You might just as well use cold water. I would like to hear from some gentleman who has experimented with cocain on abscessed teeth, or one that was abscessing.

DR. FREEMAN, Chicago. I have used it in abscessed conditions, and my results were very unsatisfactory unless I went beyond the line of inflammation; then it proved satisfactory.

DR. PARKER. The only way I have had good results in abscessed teeth with cocain is to first spray the tooth slightly, then inject the cocain thoroughly into it, as the paper states. If you can start at a point, force the cocain along and keep following it up, inserting the needle at the point which is anesthetised, you can relieve the pain; but if you insert the needle into highly inflamed tissues you will cause the patient more pain by the first injection than you will by the extraction of the tooth.

DR. J. E. CRAVENS, Indianapolis. It would appear, if the discussion were permitted to lapse at this point, that the use of hypodermics, or particularly of cocain, was valuable only for the extraction of teeth. I apprehend that a very small percentage of the practitioners who are present are willing to admit that they use local anesthesia so very often for the extraction of teeth, because they would have to admit that they do a great deal of extracting. I was very sorry that these two papers read did not have reference to something else.

I hope, Mr. President and gentlemen, that we are not degenerating into a profession of tooth-pullers. Local anesthesia is beneficial for other purposes in dentistry than simply the extraction of teeth. I have had some experience in local anesthesia by the use of cocain in the operation of scraping the roots or operating in the pus-pockets of pyorrhea alveolaris. I apprehend the operation without anesthesia is about as painful and certainly much more protracted than that of extracting a tooth.

My method is to make a saturated solution of the hydrochlorate of cocain in chloroform. I take one of those fifty-cent bottles, which is the quantity in which they are put up. A half-ounce of chloroform will dissolve the half of one of those bottles, which will give something more than a six per cent. solution after you get the solution saturated.

Before I operate for pyorrhea alveolaris I apply the cocain indirectly, not by hypodermic injection, but by introducing a small syringe into the pocket, and inject about a drop, as nearly as I can get at it, forcing it in with a plunger syringe in such a way that I know it will go to the farthest part of the pocket.

Now, hot water is necessary in my method. By the application of cocain without preceding it with water, I do not get the results. I do not succeed in reducing the sensibility of the surface of the root.

I precede the cocain application in the pockets by washing the pocket with the hot water, and I use water just as hot as I can get it there and not burn, just short of the point of scalding. I use the ordinary little syringe that holds, I suppose, half an ounce, and I discharge one, two, three, perhaps four charges from that syringe into the pocket before I apply the cocain at all, then inject a single drop of cocain. My idea is not to overflow the pus-pocket and have the cocain float about the mouth.

The first application of cocain is guarded; that is, I keep the saliva away and protect it for perhaps two or three minutes, then I wash again and apply the cocain. I make three applications of cocain in succession, sometimes four. After the third application in most cases, and certainly always after the fourth, I can go to the end of the root,—the apex, if the pocket goes that far,—and can scrape the root, as I have done in some cases until my conscience revolted, because I thought I was hurting the patient, and I have been told there was no pain felt.

It requires about fifteen minutes to make the three applications; one will not do, two will not do, but three nearly always will do, and four will do it in every case that I have encountered.

Now, one other point in regard to the cocain escaping about the mouth. If in making these injections the dentist will place some absorbent cotton around the tooth and pack it compactly about the sides, it will prevent overflowing. There is always one side where it will run out, and if you know the direction it will take by gravitation, place the pledgets of cotton there and it will take up more than could possibly escape. In case it does escape and the patient experiences the symptoms of loss of the sense of taste, stiffness of the cheeks, etc., I dissipate that in from one to two minutes by simply rinsing the mouth with alcohol or whiskey.

DR. HEWITT. I can corroborate what the last speaker has said with regard to the application of cocain in pyorrhea alveolaris. I can also corroborate what Professor Pruyn has said, for in the last five years I have been in the constant use of cocain, but never once as an injection; and I never expect to, because I do know that if a half to a grain of cocain is taken into the circulation and goes to the heart, unless it is counteracted by some such stimulant as coffee, or morphin, which is better, or by atropia, which perhaps is better still, which accompanied by stropanthin is better than all, it is almost sure death.

It is dangerous to give as hypodermic injection, unless the injection can be localized or the effect counteracted by a heart-stimulant.

About the local anesthesia of cocain, that there is such an influence nobody doubts. I have used it repeatedly for operations upon the eye without any pain whatever, and I have used it about the mouth in operations of removing tumors, but never by hypodermic injection.

A strong solvent of cocain is ether. Some of the fats will hold in solution a very large quantity of pulverized cocain; these will be taken up very readily into the tissues.

Cocain should be purchased in large crystals, because if it is purchased in fine powder you will almost always find it adulterated, scarcely ever pure. The prisms should be in their primitive rhomboidal form, clean and large; then they should be pulverized very thoroughly. Dip the point of a moistened instrument in this pulverized cocain and carry it to whatever point you choose, and the effect is almost instantaneous.

I am in the habit of using it in that way, in the treatment of pyorrhea alveolaris. I carry cocain upon the point of instruments up into the pockets, and by moving the instrument around on the gums with very excellent effect. I use the cocain solution in spray or as a pigment, a method which I published in the *Dental Review* not long ago.

In the application of the gilling - twine to hold the rubber - dam, we ought to obtund the gum by applying a little cocain before the application of the rubber - dam, or moisten the gums underneath and then drive it up home, and that holds it and the patient can't swallow it. Then apply the twine, and you are merciful. The same thing will apply in separating the teeth, as those who have used the Perry separators—the cruelest thing almost that was ever invented—can testify.

There is a large range of application where cocain is exceedingly useful, but I felt it my duty to the profession to call attention also to its danger as a hypodermic injection.

DR. PARKER. In the early formulas adopted in the use of cocain, it was believed that small doses of atropia acted as a heart-stimulant and counteracted the effect of the cocain; and I know in my own first experiments I had a number of formulas put up with small doses of atropia upon about the following plan: Carbolic acid was used to produce coagulation of the albumin and prevent absorption from the localized spot, also to prevent fermentation of the mixture; chloral to produce local anesthesia, and atropia to act as a heart-stimulant. Now, in my experience, which was quite extensive, I found the combination of other drugs with carbolic acid and chloral was simply useless, because no necessity arose that

demanding a heart-stimulant; by the administration of aromatic spirits of ammonia the moment there is any sign of muscular paroxysms, generally all the symptoms pass away; or by giving alcohol, which seems to restore the equilibrium.

DR. V. PAREDA, Bogota, Colombia. The subject interests everybody in the profession. I have practiced the use of cocaine, not because I am fond of pulling out teeth, but I have had to give experiments with a good many solutions and a good many ways of applying cocaine at my dental college in Bogota. I have found that by wrapping or binding around the tooth a bandage bathed in a ten per cent. solution of cocaine with antipyrin and allowed to remain ten or fifteen minutes will produce a good result. I have always had the idea that it is not good practice to inject solutions of cocaine. There are a good many accidents from it, and I think it is much better not to run the risk in our offices. So I have had no practice with cocaine injections; I never have used them, but I have used it topically with good effect.

The good effects I think depend on the action of the antipyrin and the cocaine; the action of the antipyrin may prevent the unpleasant effects of the cocaine.

DR. AGUILAR, San José. I have not heard anything said this afternoon about the way of preparing the cocaine which would, in my opinion, give the best results. It is undoubtedly a cause of failure in the use of cocaine in many instances that the solution after it has been prepared for some days precipitates and has no action whatever. I have been using for the last two years a preparation manufactured by a man in London, and this contains three centigrams of pure hydrochlorate of cocaine. You take in a graduated syringe fifteen centigrams of water, and a dose of the preparation which contains the three centigrams of cocaine, and you have a solution of six per cent., and you know the amount of solution you are using and the strength. Have a very small mortar where you drop the water, and dissolve it, which it does very readily, and then inject it. I don't agree to a certain extent with the opinion of the gentleman from Colombia, when he says he has good results in extracting teeth by only rubbing cocaine on the gums. I have tried that many times, and never have had any good results. When I have accomplished anything it has been by injection, and injections always have been very successful.

Now, another use of cocaine I have found in preventing nausea while taking an impression. I sometimes have used cocaine for this purpose, rubbing over the palate a solution, and so anesthetizing it partially, taking an impression without nausea or producing vomiting, which without it in many cases is produced.

A way of avoiding the bitter, disagreeable taste of the cocain, which is undoubtedly very disagreeable in some cases, is to mix with the solution of cocain a very small quantity of saccharin. I make the cocain solution in the proportion of fifty centigrams of water and three of pure cocain. I take a very small amount, just what you could get upon the point of a penknife, of saccharin, mix it with the cocain, and thus obliterate the bitter taste of the cocain almost altogether.

DR. FLETCHER, St. Louis. There is one point that we have not heard brought out this afternoon; that is, the poisonous effect of leaving it in the tissues some length of time. Some operators seem to think it must be injected and left for several minutes, probably as many as fifteen, before operating in order to get the full effect of the drug. I think in that way they gain nothing for anesthesia, and lose all by poisoning, as by testing with a sharp instrument, as stated in the paper read you can determine when there is anesthesia enough for the extraction of the tooth. Then the more quickly you can act the better, for the reason that so soon as the tooth is extracted, the cocain being in all the tissues surrounding, the bleeding that ensues eliminates the cocain with the effusion of the blood, so that you get but very little into the circulation, and it cannot possibly get as far as the heart, I think; at least not enough to do any particular harm.

DR. REID, Chicago. I have nothing to say on the subject of cocain as an anesthetic, but I believe that we are here for the purpose of saving teeth, and not to extract them, and I think the statements made here in connection with the use of these drugs have a tendency, as a rule, to cause a great deal of extracting that should not be done.

DR. ROSE. I have used a great deal of cocain in the last four years, both alone and in combination with almost all the other drugs that have been mentioned, and on the whole my experience accords with the author of the paper. It is all well enough to avoid extracting teeth, but it is not altogether right to oppose the use of it for extraction, because the dentist will use it where it should not be used. That is a mistake, and they should only use it where it is necessary.

It is used to prevent pain, not for increasing the number of tooth-extractions. There is one use of cocain which has not been mentioned. I find it very useful in case of the removal of nerves. I have often performed operations in this way that surprised me, By rubbing small portions of the cocain in a mortar or on a glass with a single drop of carbolic acid, and by touching the exposed

nerve with what can be carried of this solution on a nerve-broach, I have extracted the nerve painlessly.

DR. HEWITT. Nerves can be extracted painlessly that way if the dentist will use care and a little time. I have done it repeatedly by making a paste of cocain and glycerin. I would use the glycerin in preference to carbolic acid; you can take that paste, apply it to the bare nerve if you can get to it, then follow it clear down to the apex, and you can remove it without a particle of pain.

DR. MORRISON, St. Louis. It looks as though from all that has been said, that the use of cocain by the dental profession is for the painless extraction of teeth.

The abuse of cocain has been by men who are running shops throughout the country, placing signs from the dome to the pit that they can extract teeth for twenty-five cents without pain.

I hear with regret the essayist call attention to the fact that he extracted two central incisors, and two lateral incisors and two cuspids, by his hypodermic use of cocain for the insertion of an artificial denture, in this age of modern crown and bridge-work. We should counteract such a detrimental influence that has been produced and is being produced by the advantage claimed to have been gained by the painless extraction of teeth, for I believe from an anatomical or physiological standpoint in the crime next to abortion comes the ruthless extraction of human teeth.

DR. FLETCHER. I think the gentleman's talk was partly wasted. We are supposed to be men who are trying to save teeth, and I think the majority of the men on the floor have that in view, and only use the cocain when it is necessary to extract a useless root or a third molar that is troublesome, or in some of the operations of the teeth where a tooth must be sacrificed for the good of the patient.

DR. PRUYN. I want to protest most vigorously against the remarks of my friend, Dr. Reid, of Chicago, when he would limit us in our discussions of the use of drugs that are abused by those who are not familiar with them. We want to talk as intelligent men about drugs and their usefulness. I stand here as a medical man, as a graduate of medicine and dentistry, and I propose to talk about any range of drugs in the materia medica that can be used as a dentist; and because some abuse them is that anything to me? I get sick and tired of a discussion where it is assumed that we are all ignorant tooth-pullers because some in the profession abuse it, when we use the drug and use it intelligently. Let us understand the uses of these drugs, and by experiment find what the abuses are and bring them out openly.

I have never yet attended a medical society where any man has tried to limit the discussion of arsenic because men commit suicide with it.

My friend from St. Louis might lead us to infer that some of us who are enthusiastic in the use of cocain use it for nothing else but the useless extraction of teeth; I want to protest against any such idea. In the experience I have had with it clinically and theoretically, there are cases in which it would be unwise to use cocain—for instance, in a case of known pregnancy, or where there is any known pulmonary trouble, or where there is a diseased condition of the kidneys, because cocain has a very marked effect on the kidneys.

I find by experience the best results attend its use after the patient has had a full meal; I have found the toxic effects much more marked when used upon an empty stomach.

If I wanted to use it in a case to any considerable extent, I should first fortify my patient by the use of morphia. To those of you who want to use it, I should advise first to experiment upon dogs, and you will learn the symptoms that you cannot see unless you bring your patient down to death's door. In the dog you may see those signs so well marked that when you see them but slightly in the human you will recognize them, and know what to use as the antidote.

Dr. W. C. Davis, Lincoln, Neb., read the following paper:

OBTUNDING THE SENSIBILITY OF THE DENTINE.

Much has been said by the dental profession upon the means of obtunding the sensibility of the dentine. It is a matter which is of vital importance, for the fear of pain during cavity-excitation is probably the greatest cause of the neglect of the dental organs. This is fully proven by the way in which dentists eagerly buy the nostrums of the venders, warranted to make tooth-excitation painless; also by the readiness with which patients will enter the offices of men who advertise a painless method.

If we are to eliminate pain from an operation, we should first study its cause and the means by which it is transmitted to the seat of realization.

It seems to have been the aim to use some drug which has an action on the sensory nerve, either directly or indirectly. I believe this is all wrong.

It cannot be demonstrated that there are any nerve-fibers in the dentine, and it can be demonstrated that the dentinal tubuli are filled with a substance other than nerve-tissue. The dentinal tubuli are far too small to contain the terminal filaments of the sensory nerves,

and also the vehicle for the conveyance of blood-supply for their sustenance. The nerve-tissue cannot live unless it has access to the blood, and it is easily demonstrable that the blood does not enter the dentine. The pulp-chamber and root-canals are entirely lined with a layer of odontoblasts, each of which is connected with one or more of the terminal fibers of the sensory nerves. From the odontoblasts, extending out into the dentine, we have processes called the dentinal tubuli. The tubuli are lined with a seemingly non-destructible sheath, and are filled with a fluid, connecting with the odontoblasts. This fluid is protoplasm, not nerve-tissue.

Is protoplasm capable of transmitting the sensation caused by irritation, which is pain? If so, it can by this means communicate with the odontoblasts, which in turn communicate with the terminal fibers of the sensory nerves. Thus we have connection with the brain. I think it can very easily be demonstrated that protoplasm can transmit the sensation caused by irritation, either mechanical or chemical.

In the amoeba, which is protoplasm, we find exhibited all the various phenomena of life, also the exhibition of pain. Now it is not difficult to suppose that the protoplasm contained in the dentinal tubuli is similarly capable of transmitting the sensation of irritation to the odontoblasts.

Subject the amoeba to chlorid of zinc or carbolic acid, and it will coagulate it. This is true when applied to the dentine. It will coagulate the protoplasm, thus destroying its life and obtunding its sensibility, because we have destroyed the medium through which the sensation is transmitted. This is true of arsenic applied to the dentine, and if the action of arsenic could be limited to the dentine alone, we would in this agent have a perfect obtundent of the sensibility of the dentine. But as its action is not controllable, the death of the pulp follows its use.

In view of the fact that we know the cause of the irritation and the medium by which it is transmitted, and as this medium is not composed of nerve-tissue, and as its destruction is not permissible, nor its coagulation, owing to the jeopardy to the pulp, it is my theory that the only means by which the dentine will ever be rendered insensible to the surgeon's instruments is by the removal of the protoplasm from the dentinal tubuli. This would of itself be sufficient, were it not for the fact that the dentine is hygroscopic—capable again of taking up moisture; from within by capillary attraction, from without by contact with the atmosphere.

It is therefore my theory, that after the extraction of the protoplasm, we should deposit in its place another substance which is not

in itself capable of transmitting sensation. The best means of extracting the protoplasm is the application of some agent not in itself injurious to the dentine or pulp, but which has a great affinity for moisture, of which protoplasm is very largely composed. Absolute alcohol is at once suggested. To assist its chemical affinity for moisture, it had best be applied warm, as heat assists chemical action and also favors evaporation.

If hot air is then applied, it will thoroughly vaporize the alcohol, carrying away the moisture it has extracted from the tubuli, leaving them empty. To whatever distance they have been emptied, to that distance we have destroyed the medium for transmitting pain. In other words, we have obtunded the sensibility of the dentine. The next step is to fill the tubuli with some other substance. I fill the tubuli with a resinous gum in suspension in a volatile oil. Almost any one of the essential oils will answer the purpose, as they are composed of volatile oils and the resinous gum which we need. Probably nothing works better than oil of cassia, as upon the application of hot air the oils are easily volatilized, and if it has been diluted slightly with alcohol, it will readily go into the tubuli as far as they are empty, leaving its gum to fill the space. To this distance you can excavate with impunity; consequently, the success of the operation will depend upon the thoroughness with which you extract the protoplasm. In teeth of some structure, it seems to be readily extracted to a considerable depth; in others it is next to impossible. I do not think the failure of this method in some cases is due to any nerve structure or nerve complication, or nervous idiosyncrasies of the patient, but rather to the anatomical structure of each individual tooth and each individual cavity. For I sometimes find cavities in the same teeth, perhaps one on either side, seemingly the same distance from the pulp. In one it works perfectly, in the other it is extremely difficult to operate, sometimes meeting with no success. At the same sitting I will find a difference in different teeth in the same mouth. You may ask what I consider the difference in the anatomical structure, which would cause such a variance in the result of our attempts to extract the protoplasm.

I believe this is partially due to the relation of each tubule to its neighbor, and partially to the size of the tubuli, as they vary considerably. In the relation under consideration, where they are disconnected and are greatly anastomosed and small, it is impossible to affect them to so great a depth. Again, I believe that where the tubuli are filled to quite a depth with the products of fermentation and micro-organisms, this also hinders us, as alcohol does not have a great affinity for these ferments; consequently they

would not be taken up so readily as where the tubuli are filled with unadulterated, healthy protoplasm. In proof of this, I find that it is easier to thoroughly dry the cavity by use of absolute alcohol and hot air after it has been extracted to some depth. Also, in cavities which are decaying rapidly, necessarily being filled to some depth with the products of fermentation and micro-organisms, it does not seem to be so readily taken up as in cavities that have at one time been in the process of active decay, and it has ceased and become hardened, glazed over, and sometimes become black or brown.

The profession has many times resorted to the process of freezing, to obtund the sensibility of the dentine. This method will work when the temperature is sufficiently reduced to freeze the protoplasm in the tubuli, thus rendering it in such a condition that it cannot transmit sensation. You find this true of the *amœba* as well. If cold is applied, its activity is lessened. If a moderate degree of warmth is applied, its activity is materially increased, until a certain temperature is reached, when it ceases. If a sufficient amount of hot air, not permissible in the mouth, is applied, its destruction can be made permanent. I believe there is no method which has partly obtunded the sensibility of the dentine, whether freezing, superheating, application of caustics or devitalizing agents, etc., that cannot be explained upon the hypothesis given. However, this method of obtunding the sensibility of the dentine will come nearer attaining success than any before presented, inasmuch as a foreign substance is inserted in its place, after extracting the medium for transmission of pain.

In cases where local means seem to meet with failure, a general anesthetic is resorted to.

Take an ordinary gas apparatus with a Buffalo inhaler. In the inhaler place one drachm each of alcohol and ether; also four or five drops of nitrite of amyl in solution. Administer as in giving nitrous oxid. The first effects noticed are those of the gas. Five or six inhalations of this compound anesthetic are sufficient to produce anesthesia. The symptoms are similar to those after administration of nitrous oxid gas alone, with addition of the flushed face caused by nitrite of amyl. The anesthesia from the gas and ether soon passes away, leaving the patient semi-conscious, with the power of conversing with the operator and seemingly capable of realizing all that is going on; but there seems to be a temporary paralysis of the fifth nerve, especially the third division, lasting from ten to fifteen minutes, sometimes twenty. It is a fact well known to the medical profession, that a few inhalations of nitrite of amyl will give speedy and temporary relief to neuralgia; also the suffocating sen-

sation incident to an attack of asthma; also that upon its administration there seems to be dilation of the capillaries in the parts supplied by the fifth nerve, as is evinced by the flushed face; altogether going to show that this drug seems to have a special action on the fifth nerve. This led me to experiment, with the result above stated. These two methods will make the operation of tooth-excavation entirely painless, the result being universal as far as my experiments have gone at present.

For general practice I would not at present care to advise the use of any general anesthetic for an operation upon the teeth. It is certainly attended with some danger. The amount of danger connected with the administration of an anesthetic as complicated as the one just given, I am not now prepared to state. However, I believe it to be comparatively safe, as the action of the various ingredients upon the cardiac muscles and region, as well as upon respiratory organs, is antagonistic.

SECTION V.—DENTAL AND ORAL SURGERY.

On account of the absence of the chairman of this Section, the Secretary, Dr. Dotterer, was authorized to open the session.

Dr. M. H. Cryer, of Philadelphia, Pa., read the following paper:

THE SURGICAL ENGINE AND ITS USES.

The use of the surgical engine as now adopted for operations on bone-structure has taken a place secondary to no other means. The first requirement of the machine is a motor power that will give a velocity of at least from two to three thousand revolutions per minute, maintainable under varying pressure. The hand-piece and the chuck are to be light, capable of easy adjustment, and of such arrangement that the instruments can be carried in any direction to any part of the body. There should be no appreciable vibration to interfere with tactile recognition of the character of a tissue being cut. The device for the clamping of instruments in the hand-piece should permit of easy and quick exchange and instruments firmly held. The source of the driving force is of little import, but must be under perfect control and insure steadiness and uniformity of speed.

The first means for employment of the method in bone-surgery was the ordinary dental engine with surgical appliances, which is still in use for light operations, but it lacks sufficient power for cutting harder tissue. There have been introduced to the profession in the last fifteen or seventeen years several engines denominated "Surgical"; the best, up to within a few weeks, is the Bonwill, which

was brought out about 1875 or 1876. The power in this engine is applied by a crank which is geared to a large driving-wheel. In connection with the hand-piece there are certain imperfections with respect to surgical requirements. The shanks of the instrument have to be the same in size as those used with the various dental engines, and are too small for the easy accomplishment of surgical work. They are liable also to bend or break. The chuck is badly arranged as to capability for convenient exchange of instruments, while it does not prevent them from slipping or dropping from its grasp. The cog-gearing in the upper end is also defective. About three years ago the Bonwill improved dental hand-piece was tried and found to be better in some respects than the original, as it did away with the defective cog-gearing. It is the impression of your essayist that the defects in the hand-piece here alluded to explain the dissatisfaction expressed regarding the surgical use of the engine by many who fail in manipulating it.

About ten years ago The S. S. White Dental Mfg. Co. introduced a surgical engine. This is somewhat similar to their first dental engine, differing from it in little but an arrangement which turns it by hand, and in a heavier and stronger arm and cable. The surgical advantage lies with the hand-piece, which is larger, and takes the shaft of an instrument about twice the thickness and length of the ordinary dental bur. The tool is held in place by a latch-like bolt which cannot come unfastened accidentally, yet when necessary allows speedy change of instruments. Unfortunately, this machine is not adapted for heavy work. The driving power is too light, and the arm does not permit the hand-piece to be carried to all desirable positions. Heavy pressure upon the instrument produces a vibration and back-lash that is very annoying. About eighteen months ago I had that part of the White surgical hand-piece which holds the instruments adjusted to the driving portion of the Bonwill improved dental hand-piece, and have since used this combination with the greatest satisfaction in all kinds of light and heavy operations, in conjunction with the remaining portion of the Bonwill surgical engine. Last winter I consulted Mr. C. Doriot, who suggested a new engine which should have greater power and better mechanical arrangements than those now in use. The S. S. White Dental Mfg. Co. gave him facilities to work out ideas about which we had mutually agreed, and I have great pleasure in introducing the result to the profession in this meeting. The general appearance and construction of the engine proper is similar to the Bonwill, though it is a much stronger machine, while its mechanism is of a higher order. It has been completed only a few weeks, too late for

an opportunity to use it in the hospital clinic, but its work as tested upon dead bone is fully satisfactory.

The manifold uses of the surgical engine may be best understood by the citation of a few typical operations in which it is successfully employed. For example, removal of sequestra, caries, osteomata, and for cutting into and through bone for the resection of nerves.

I. *Removal of Sequestra*.—A case of a sequestrum which came under my notice was that of a surgeon, wounded during our civil war in the lower third of the left thigh, the ball splintering the femur and causing subsequent abscesses and fistulæ. At different times the bone had been cut down upon, and the parts chiseled and scraped without effecting a cure. About five years ago the patient came to the Hospital of Oral Surgery for treatment. It was decided to open the parts, which being done, the bone was found to be diseased to the extent of six or seven inches. There were also several cloaca through which a sequestrum could be felt incased within the shaft of the bone. By means of the surgical engine, a bur and circular saw being used, a longitudinal section of bone was cut out, exposing the sequestrum. Upon its removal the rough edges and remaining dead bone were burned away. The parts healed remarkably well, and have since given no trouble. Similar results in caries of like nature are numerous, the percentage of recoveries being greater than when performed after the ordinary manner, by reason of lessened shock and local disturbance.

II. *Removal of Caries*.—Case after case of permanent success attained in this department of bone-surgery might be quoted, especially when diseased parts of delicate and thin bone are to be operated upon, or where the pathological tissue is closely associated with vital parts and healthy portions of bone are worthy of being saved, as for example with bones of the face, cranium, vertebræ, and ribs. The resection of a carious superior maxilla can be seldom accomplished after the old way, using bone-forceps, chisel, and gauge, without injuring healthy and adjoining parts. By the use of the engine a diseased portion can be harmlessly cut away. In extreme caries of the inferior maxilla a rim of healthy bone with overhanging edges of periosteum can be and is often saved.

III. *Removal of Osteomata*.—A young lady about eighteen years of age had an enormous growth covering the anterior surface of the right superior maxilla. This enlargement, consisting of an ivory-like exostosis, was removed by Prof. Garretson and myself. No external cut was made. The lip was raised, and the cheek dissected from the osteoma. By using different-shaped long-shanked

burs, the hard tumor was cut away. During the operation the instruments were often withdrawn and the cheek allowed to fall into place, thus making sure that the proper contour was being obtained. Had the hammer and chisel been used, the face would necessarily have been opened, thus making an additional risk and leaving a very deforming cicatrix.

IV. *Cutting for the Resection of Nerves.*—During the meeting of the American Dental Association last year, I reported a new operation for the resection of the inferior dental nerve. (See Transactions of the Association for 1892, page 66.)

The proper amputation of the nerve at the oral foramen is one which involves no little difficulty at times, by reason of the hemorrhage and the limitations imposed by the surrounding tissue, which interfere with direct vision. The bony structures offer an unyielding resistance to the use of any of the special instruments which have heretofore been used for the purpose. To obviate the difficulties which I have noted and to furnish a means for the amputation of the nerve with certainty and precision at the exact point desired (in the case under consideration the foramen ovale), I have devised an instrument which I call a neurotome. It is constructed of steel, and consists of an outer tube with a fenestrated end, the free extremity of which is rounded or tapered, and having on its inside surface, near the end, a projecting shoulder which is continuous around the inner periphery of the outer or canular tube. The inner cutting portion of the instrument consists of a steel spindle which fits closely and smoothly within the outer tube, and has its free end fashioned into a tubular knife similar to a cork-borer or leather punch. In use, after the nerve has been dissected out from its canal, its end is passed through the distal opening of the neurotome and out through the fenestrum in its side. The instrument is gradually pushed along the nerve, and worked in the direction of its foramen of exit. When it has been ascertained that the end of the neurotome has been brought into close contact with the bone at the foramen, and the nerve is made tense by traction, the central cutting-punch of the neurotome is driven home with a rotary motion against the shoulder mentioned before at the end of the outer canular tube, which will cleanly sever the nerve at the point desired, with no risk of injuring the deeper structures or the adjacent blood-vessels.

At the time of the Niagara meeting the operation had only been performed twice. Since then it has been done many times with entire success. The most interesting example was one in which eight distinct and separate operations by some of the most skillful surgeons had been performed for the relief of neuralgia in the region

of the lower jaw. Two attempts at cure were made preceding the one I suggested. On October 8, 1892, the lower lip was opened through the median line to the lower border of the mental process, and an incision made along the body of the bone to the insertion of the masseter muscle. The lip and cheek were then dissected from the bone, and the inferior dental canal opened by suitable burs driven by the engine. The nerve was taken out of the canal and the soft parts readjusted. On returning to consciousness, the patient felt no relief whatever. The rest of the pain seemed to be localized upon the body of the bone, especially on the inner side. On the following Saturday, October 15, it was thought best to open the parts, and by the use of the engine-bur the greater portion of the body of the bone on the left side was removed, but no relief was obtained. Time was given for the parts to heal and for the patient to recover from the shock, in the hope that the pain might pass away; but it became more and more aggravated. The patient's sufferings were so great that he would throw himself on the floor and cry for relief. Finally Prof. Garretson decided to perform the operation that I had suggested. After deepening the sigmoid notch by the use of a barrel-shaped engine-bur, the nerve was fully exposed to view. The patient was well under the influence of ether, and did not respond to the cutting of the bone or other tissue, but as soon as the nerve was seized by the hemostatic forceps, he exhibited, by his movements and outcries, the agony of the pain. The nerve was drawn out of the canal and cut off as high and near to the oval foramen as possible. Upon the section of the nerve which was removed, there were two large and distinct neuromata, the lower one being impinged upon by the triangular process of bone at the opening of the inferior dental canal; the upper one was under the external pterygoid muscle. Beyond a doubt here was the cause of the neuralgia. Several arteries were ligated before the parts were closed. The patient came from under the influence of the ether without the slightest pain, and has not had a twinge of any kind whatever up to this time. It is now over nine months since the operation was performed.

These cases are given as typical illustrations of the very many in which the engine has been successfully employed in my personal experience, commencing about 1876, with the ordinary dental engine, and with the Bonwill surgical engine in 1881. In addition to these cases there might be named resection of the elbow-joint, resection of a portion of the ramus at near the angle of the inferior maxilla, in order to make a false joint to relieve a true ankylosis of the temporo-maxillary articulation.

The removal of a diseased portion of the calvarium measuring

three by four inches without inflicting any injury to the membrane of the brain, osteoma from the floor of the orbit, osteoma from the inferior surface of the body of the sphenoid bone. This tumor plugged up the posterior nares and filled the greater portion of the naso-pharyngeal space.

Caries of the mastoid process of the temporal bone. For the relief of coxalgia by removal of the coccyx, through an external opening, without disturbing the perineum.

Treatment of alveolar hypertrophy, for freshening the edges of a recto-vaginal fistula. In freshening the edges or surface of soft tissue, coarse corundum-wheels or stones are used, with a free flow of water running over the parts. I have recently received two communications relating to the use of the surgical engine in the removal of large calculi from the bladder; the first from Dr. Bonwill, and the second from J. G. Kerr, M.D., LL.D., of Canton, China, who is a specialist in this line of surgery.

It must be seen that the surgical engine has a wide field of influence before it, not alone in bone-surgery but in that of other tissue as well.

As yet it has not been much employed for operations in brain-surgery, but it is assumed that the time is not far distant when it will be universally used whenever the brain-case is to be opened.

At the conclusion of his paper, Dr. Cryer explained the operation of his new engine, and gave practical illustrations of its work. He could not give the exact speed with which the engine was usually operated, but estimated it to be from fifteen thousand to eighteen thousand, and possibly as high as twenty-five thousand revolutions per minute. In operating the engine, the power should be uniform. He showed the applicability of the engine for many uses in general surgery, and said it was especially useful in operations for trephining the skull. One of the beauties of the engine is, that in removing the inferior maxillary bone, and cancerous growths, it is possible to remove the disease, and the bone down to the periosteum, and the bur which removes the bone will not cut the soft tissues. In this way all the diseased parts can be removed much better than by the old method of using the chisel and mallet, which would break the bone, and injure the periosteum and soft tissues. In working in the back part of the mouth, there is no danger whatever of cutting the soft tissue, while it will perfectly cut all of the bone. By using corundum-wheels, under a free flow of water, soft tissues can be cut away.

Dr. Bonwill invented the first engine of this kind, while this one was made by Dr. Doriot.

At this point Dr. Brophy arrived, and then took the chair.

DISCUSSION.

DR. CRYER. I have said in my paper that it was better to cut a nerve in these section operations than to break it. I would like to know if any here differ with me in regard to it—I mean, where the nerve is dissected out of the canal, whether it is better to break it at that point or to cut it.

DR. JNO. S. MARSHALL. I had supposed from my reading, observation, and work, that the method of avulsion was the best means. Pull it away and break it off, as far as you can, in the canal. The best results that I have seen have come in that way, and better than cutting.

DR. CRYER. There is this objection to breaking a nerve. We know that the nerve consists of an axis, cylinder, neurilemma, and the white substance of Schwann. If we take the ordinary electric wire, used in houses, we find that if we unwrap that wire, we find a white insulating substance, and under that the cylinder or wire. In the nerve we have a similar relation of conditions. In hotels we have annunciators, so that the hotel clerk may know exactly what bell is being touched. This corresponds with the room by a number in the office. If a mischievous boy would fray the insulation of that wire and put a knife across it, the bell would ring. And if he should send up to the room, he would find that no call had been made. So, if we press upon this nerve at any point, in the same manner it will communicate a pain at a point where really none exists. Now, as these wires are insulated, so are the nerves. If you fray the insulation, you will have a ringing of the bell, or in other words, you will have a pain falsely located in the same manner. A girl fell through the skylight and injured her arm, cutting off a nerve. After the wound began to heal, she had great pain in the hand. I know that she had lost some two inches of the nerve, but still she had this pain. The nerve had been scraped, and lost its neurilemma, and the white substance of Schwann. It was decided to open up the wound and make a clean cut, and when that was done, the patient had no more pain in her hand. So I believe it is best under all circumstances to cut the nerve.

From Dr. Marshall's standpoint, you draw it out of the canal as far as possible. The nerve may be in trouble at some point in the canal; he draws it away to get relief. Now, I agree with Dr. Marshall, pull the nerve out of the canal as far as possible; then, when

you get hold of it, pass this instrument up (illustrating with the instrument upon a string), and then the nerve is cut. I pull on the infra-orbital nerve, and cut it off, and upon a subject I found it had been incised within the brain-case.

DR. MARSHALL. The only difference is, Dr. Cryer followed it up, and cut it off, instead of breaking it.

There is one point that it seems to me can be explained in another way; in my mind, the cause of the trouble was the cicatricial tissue over the injured nerve. As soon as he removed the tissue from the nerve, he cured the case.

DR. CRYER. If the wire is frayed out, then by pressure the bell will ring; and if you had a bundle of nerves, or one nerve, and the axis-cylinder was liberated, without any insulation, and they come in contact, you would have the pain as the response.

DR. MARSHALL. There is another point I am told was in your paper,—the question of painless cutting.

DR. CRYER. It is not in the paper; it was in the discussion.

DR. MARSHALL. It has always been recognized that if we could get impressions rapidly enough so that a cut could be made faster than the impressions could be carried to the brain and returned, we would have painless dentistry or surgery. It is calculated that the conductivity of impression to the brain is about eighteen thousand inches in a second, and if we could get something that would cut faster than that, it would be painless. I would like to know if Dr. Cryer has made any experiment with this engine in that direction.

DR. CRYER. As I stated to Dr. Elliott, we have made no test by measurement to exactness, but I know we can drive it up to eighteen thousand revolutions per minute, and we have removed the greater portion of the inferior maxillary bone, with the bur, with very little pain to the patient. When the engine was running slow, there was pain, and when we got up as high motion as possible, there was little or no pain.

DR. BARRETT. Dr. Cryer's theory of tearing the nerve instead of cutting it off, presumes that the neurilemma is a perfect insulation. I am not ready to grant that that is its office. In the use of electricity, by which you get contraction of muscular tissue through conveyance of the electric current by the nerve, it must be by transference of electricity into nerve-force. I would ask Dr. Cryer if he desired that there should be contraction in a blood-vessel which he had severed, like a small vein, which would cause the contraction of that, and the cleanest healing of it, the cutting of it, or the bruising of it? We all know that when we wish to stop bleeding we use a torsion. I think that is more nearly the analogue of the nerve

than the insulation of the wire. I take issue with him, on the ground that it is better to tear it asunder, providing there is not too much violence used, and too great a shredding of the tissue, or white substance of Schwann.

DR. CRYER. I am not a histologist, in any sense of the word. When I am at a loss about anything, I go to the best-informed person that I know. I may be wrong in my teaching that has been given in regard to insulation of the nerves. It has been taught to me, and I have that idea at the present time. I am glad Dr. Barrett has brought it up. I cannot agree with the Doctor, that a vein or artery is an analogue to the nerve.

DR. BARRETT. I did not say it was an analogue, but as near that as the other.

DR. CRYER. We all know that if we use torsion in the case of a blood-vessel it unites together, and forms a clot almost instantly. And in the nerve-tissue we all know there is the axis-cylinder, and if it is frayed, it will be broken up, and the nerve-filaments come together; under which circumstance we have for example pain in the hand when the injury is not there. Where the nerve can be severed squarely across, it is not necessary to heal it up, as in a vein or artery. That nerve, if it is not removed too far, will reunite. I have in my own body an injury where two and one-half inches of the nerve was removed, and which has since reunited.

DR. FILLEBROWN. Perhaps there is another reason for this pain, that has not been described. When we do torsion for a vein or artery we do not wait for inflammation to stop the hemorrhage, we stop it right off, as soon as we have done the torsion. It mutilates the part and entangles the blood, which coagulates, and stops the circulation. As I understand, in the case of this nerve-pain, it is the cicatricial tissue that produces the pain by pressure. Dr. Cryer says, if we cut it off smoothly we do not have pain. If the nerve is torn out there is a chance for a large amount of cicatricial tissue to contract and bring the fibers together, and causes a pressure over a large piece; but if we cut it off squarely there is only a small place covered. The cutting of the nerve is physiological, scientific, and right, and will no doubt relieve pain. But the main question raised by Dr. Marshall was, that you get more of the nerve-tissue away by pulling than by cutting. Now, if Dr. Cryer has an instrument that goes into the canal, and reaches the same point as if it was pulled out, there is so much clear gain by that means.

DR. BROPHY. I desire to explain a method which I follow, for the removal of the inferior dental nerve. It is a well-known fact,

that if the nerve is divided and a piece removed, it will re-form, and the disturbance which prompted the surgeon to remove it will recur. Now, after we have removed a good liberal portion of the tissue covering it, we draw it forward as far as we can and divide it. After this is done, the engine-bur should pass along the entire length of the canal to the foramen, turning up the surface of the bone forming the canal, the exudation fills the canal, and absolutely prevents the re-formation of the nerve. I have a number of patients, and could demonstrate the merits of the operation, by showing the nerve has not re-formed. It only takes a few days for the exudate to form and permanently plug it, and prevent any possible chance for the nerve to re-form. I am glad Dr. Cryer has brought this powerful and excellent engine before us. I have used an engine for many years, and found it very useful, although it is not as powerful as this. With this engine, the dental surgeon will be better able to perform his work, and the regular surgeon will be able to perform many operations of surgery; like trephining and removal of osseous growths, far better than it could be done by chisels and saws, and other instruments now employed for that purpose.

DR. FILLEBROWN. Ordinarily, the resection of the nerve is sufficient. I believe in ordinary cases it is sufficient to take out an inch or an inch and a quarter of the nerve. In some cases, I would say that Dr. Cryer's operation is an excellent one to perform, and exceedingly efficient. I think with that explanation, whatever criticism that I made last year must be well softened down and removed.

At this point the session adjourned until 3 P.M. Wednesday, discussion upon Dr. Brophy's paper being postponed until that time.

SECTION VI.—OPERATIVE DENTISTRY.

The Section met at 2.30 P.M. Dr. Daniel N. McQuillen in the chair.

Dr. Wm. Jarvie, chairman, read his opening address.

Dr. Henry Morgan, of Nashville, Tenn., secretary of the Section, read a paper by Dr. H. L. Ambler, of Cleveland, Ohio, on "Tin Foil for Filling Teeth."

TIN FOIL FOR FILLING TEETH.

When we take a retrospect and consider what a poor excuse tin foil was twenty or more years ago, we do not wonder that it failed so often to make tight, good-wearing fillings. When it came from the manufacturer it looked fairly bright, but after being exposed to the air it assumed a light brassy color, and lost what integrity it

formerly possessed; No. 4 was generally used, but it would cut and crumble in the most provoking manner. At that time fillings were made by using mats, cylinders, and hand pressure, similar to the use of non-cohesive gold, and it was very difficult to insert a respectable approximal filling. Several years ago a radical change came about, for which the manufacturers should have their share of credit, as with the tin we now have, you can begin at the base of any cavity and with mallet or hand force produce a filling which will be one compact mass from beginning to end, so that it can be cut and filed the same as gold, though not with so hard a surface as gold. Tin adheres, coheres, or welds, call it what you please, makes a saving, solid, tight filling, and with less malleting than gold requires, for if over-malleted, the receiving surface is injured. It is a good material for filling many cavities in temporary teeth, and children will bear having it used, because it can be done quickly and does not require much mallet or hand force to condense a single or double layer of No. 10. Up to the age of fourteen, or longer, we find many teeth which are quite chalky, with the oral fluids in such a condition that oxychlorid and oxyphosphate do not last long, and for some reason amalgam and gutta-percha soon fail. In all such cases we recommend tin, even in the incisors, for as the patient advances in years the tooth-structure generally becomes more dense, and if desirable the filling can be removed, and good saving operations made with gold. Approximal cavities in young teeth, filled with cohesive gold by good operators, often fail in one or two years, but refilled with tin the teeth are preserved. In approximal cavities attacked by white decay, the most formidable variety known, we would separate freely from the palatal or lingual side and fill carefully with tin.

It is invaluable when you are limited for time or means, and also for filling the first molars where we so often find poor calcification. Dr. S. B. Palmer says, "Tin not only arrests decay mechanically, but in frail, chalky structure acts as an anti-acid element in arresting the electric current set up between the tooth-structure and the filling-material." We *often* find the dentine beneath fillings which have been removed, considerably discolored, and greatly solidified as compared to its former condition, and we believe this condensation, or calcification, is more frequent under tin than gold. We have seen cases where the pulps had calcified under tin, and it has been known for years that tin would be tolerated in large cavities very near the pulp without causing any trouble. In many mouths tin does not oxidize, but retains a clean gray color. The objectionable color assumed where it does oxidize, is offset by the fact that the oxid fills the ends of the tubuli and often arrests further

decay. Where fillings are subject to great attrition, they wear away sooner or later, but they can easily be replaced, and, as the portion against the walls is the last removed, further decay is prevented as long as there is any reasonable amount of tin left, and if the tooth-structure has become sufficiently solidified, you can cut proper anchorage and cover the tin completely with gold. It may be driven into or onto the tubuli, so as to completely close them from outside moisture, and often the tin takes such a hold that it requires a cutting instrument to remove it.

The extra tough foil now manufactured retains a bright surface, and does not lose its good qualities even after considerable exposure to the atmosphere, but we prefer to prepare only what is needed for each case, keeping the rest in the book placed in an envelope. Tin of this kind, well condensed by mallet or hand force, stays up against the walls of a cavity and makes a tight filling, and ought to be called perfect, because it preserves the tooth, probably expanding and contracting less than gold, and giving a surface which will wear from five to ten years, depending upon the size and location of the cavity. Buccal cavities in the first molars, and palatal cavities in the incisors, filled for children eight years old, are still in good condition after a period of fifteen years, and we have seen fillings twenty-five years of age. Strips of No. 10, from one to three thicknesses, can be welded together, cohering as well as semi-cohesive gold, or better, and can be manipulated much more rapidly; therefore, if desirable you can produce any contour.

Some operators have advocated using gold and tin folded together in alternate layers, thus exposing both metals to the fluids of the mouth, claiming that fillings can be made quicker and are not as subject to thermal changes, and can be inserted nearer the pulp than when gold is used. These claims are entirely met by using tin alone. Others say that this union of gold and tin will preserve the teeth quite as well as a correct gold filling, but we do not see that it offers any advantage over either tin or gold, except that it wears somewhat longer than tin.

Instruments with square ends and sides, and medium serrations, are best adapted for hand force, and the majority of mediumly serrated hand mallet instruments will work well on No. 10 tin of one, two, or three layers, using a four-ounce mallet with a fair, steady blow; but the force of blow will be guided by practice, thickness of tin, size of instrument, and depth of serrations. You must have absolute dryness and use care, not thinking because it is *tin* that it will be all right anyway. Fold the tin into strips of different widths, thicknesses, and lengths, according to size and location of cavity, but

for a large crown or approximal cavity the strips may be folded into mats or rolled into cylinders; but as more force is required to condense them, we generally prefer strips for frail teeth. To make the most *pliable* cylinders, cut a strip of any desired width from a sheet of foil and roll it on a broach, cutting it off to make cylinders of different thicknesses. When the cavity is full, go over the tin thoroughly with mallet or hand force, cutting down crown fillings with burs or corundum-wheels, and approximal fillings with sharp instruments, emery strips or disks. After partially finishing, give the filling another condensing with the burnisher, then a final trimming and moderate burnishing. By trimming fillings before they get wet, you can remedy any defects with a sharply-serrated plugger and thin strip of tin as easily as with gold.

Generally cavities are prepared the same as for gold, except that the grooves or pits should be a trifle larger. Many cavities can be filled with less excavating than required for gold, and some approximal cavities in bicuspid and molars can be well filled without removing the masticating surface. Here especially the cavities should be cut square into the teeth, so as not to leave a feather edge of tin when the filling is finished; but usually we cut the cervical margin down to a smooth strong edge, even if it goes beyond the gum or enamel margin. Now cut a *slight* groove across far enough from the margin so that it will not be broken out, make each end of this groove square or with *slight* pits, then from each pit cut a groove which will extend to the masticating surface. In nearly all approximal cavities in bicuspid and molars you will find some form of matrix of great advantage. By driving the tin firmly against the matrix you secure a well-condensed surface, and the teeth will move apart *slightly*, so that with a bevel or thin plugger you can force the tin between the matrix and the edge of the cavity, and thus be sure of having a tight filling, and plenty of material to finish well; then, after removing the matrix condense with thin burnishers, and complete the finish as for gold. Where no matrix is used, or where it is used and removed before completing the filling, it is well to trim the cervical border, for in either case there is more light and room to work when only a portion of the cavity has been filled.

Be sure of all margins as you progress, and if the cavity is deep and a wide matrix shuts out the light, use a narrow one which can be moved toward the masticating surface as the work progresses. In the incisors and cuspids where the labial or palatal wall is intact, this matrix can be bent at either end as the case requires, so as to make room for operating. We prefer to save the labial wall and line it with five layers of semi-cohesive gold folded into a mat and

extended to the outer edge of the cavity; this gives the tooth a lighter shade. Bicuspidis can be treated in the same way, a method originally used by Dr. Corydon Palmer. The tendency to crush or slide out during the process of filling is entirely overcome by using a matrix. We find that tin prevents further decay at the cervical margin of deep cavities oftener than any other metal or combination of metals. We fill from one-fourth to one-half of the cavity with tin, completing with gold when the tooth is of good structure, which gives all the advantages of gold for a masticating surface. Have the tin solid and square across the cavity, and the rest of the cavity of a good retaining form, the same as for a gold filling; then begin with a strip of gold slightly annealed and mallet it into the tin, but do not place too great reliance upon the connection of the two metals to keep the filling in place. We have sometimes filled incisors and cuspid approximal cavities along the labial margin with gold when the tooth was of medium structure. The fee should be reasonably large, for you can save many teeth for a longer time than with cohesive gold. Every good dentist, with a little practice, can accomplish all that the writer claims can be done, as there is no special secret connected therewith.

DISCUSSION.

DR. E. T. DARBY. The author of this paper has certainly paid a very high, and I don't know but a very worthy tribute to tin. There is nothing new in the paper, as far as I know; the use of tin almost antedates the use of gold as a filling-material. The French first used lead, then tin; tin was used as early as 1800 in this country, to the exclusion of almost every other material. In the earlier years of my practice tin foil was used a good deal and amalgam very little; there was a prejudice in the minds of many practitioners against the use of amalgam, because it was composed of equal parts of silver and tin combined with mercury. Consequently, the chief metal used was tin. Soon after I began to practice for myself, some one suggested to me a good method for preparing tin. Make an ordinary sand mold and then melt chemically pure block tin in a spoon and pour it in this mold, making the tin in the form of a corundum-wheel. This is put on a lathe, then with a very sharp chisel the tin is turned off, making shavings as thin or thick as desired. They can be made exceedingly thin, and are exceedingly tough.

During my college days some members of the faculty said tin would weld, and others said it would not. I took a tooth to my room, cut the crown off, and invested the roots with plaster of Paris, restoring the whole crown to its natural size. With tin foil I polished

it up nicely, then took it to one of the professors who questioned the cohesive properties of tin, and said to him, "This tooth has been built up with ropes of tin on two retaining points." He said, "You have melted that tin." I said, "No, sir, I built that up in my room under the eye of some of my college-mates, and it has been done as I said." He expressed surprise. I have kept that tooth, and show it every year as one of the evidences of the cohesive properties of tin.

I have always said that tin was one of the very best filling-materials we have. I believe more teeth could be saved with tin than with gold. Whether tin possesses the antiseptic properties in as great a degree as is claimed by many, I sometimes question, but I do know that tin has a saving quality that we do not always find in gold. The method of combining tin and gold is not used. Dr. Jenkins, of Dresden, was the first advocate of filling teeth with tin and gold. I have been in the habit of combining tin and gold in some cavities, but I do not see any especial advantage in it. I cannot see that the filling is any better by incorporating the gold with the tin. There is but one disadvantage that tin possesses, so far as I am aware, that is its color, but in all approximal cavities that are exposed to view I believe the average dentist will do as well with tin as with gold. I believe if the dental profession would use more tin, they would save more teeth. For children's teeth I know of nothing better for masticating surfaces. A good tin filling will condense upon the masticating surfaces of children's teeth, and I think save them better than anything else. I should use it much oftener than I do if it were not unsightly in the mouth. I indorse heartily and emphatically the tribute which the essayist has paid to tin.

MADAM HIRSCHFELD TIBURTIUS, of Vienna, heartily indorsed the use of tin and gold, after a practice with this material for twenty-four years. Like Dr. Darby, she tested the cohesive properties of tin by building up some crowns with this material. Her practice has been mainly for children and ladies, and she thinks for filling children's teeth there is no better material than tin and gold; sometimes these fillings were put in when the child was seven or eight years old, and at the age of seventeen the fillings were still perfect. She makes a filling of tin and gold that looks nearly as yellow as gold; for this filling two sheets of gold No. 4 and one of tin, *very thin*, are used; it looks just as bright after having been worn two years as when it was first put in.

DR. R. R. FREEMAN, Nashville, Tenn. You don't know how happy I feel to hear the subject of tin foil brought up before this Congress. I learned something of tin in the early school, when I

had the honor to be upon the stage with Madam Hirschfeld, when we received our diplomas. I have written upon tin foil, I have talked upon it and advocated its use. I remember Dr. Truman said that tin foil was one of the best fillings, not excepting gold. I know what it is doing, and I know what it has done for twenty-five years.

All through our southern country we have those who are using tin foil for its therapeutic properties; it has that healing property for the dentine of children's teeth, that hardens them, and it has been only a few years ago that one of our best practitioners said, "I must acknowledge that tin does retain teeth." A very wealthy family was once summering with me, and while there, their teeth needed some attention; some of the teeth looked dark, and I found that the teeth were decaying. It was with considerable effort that I tried to save those teeth; and their dentist came to me with the inquiry why I had filled teeth for patients with tin, who were abundantly able to pay for gold. I told him, in order that the teeth might become developed and hardened under the tin, and that it did so was evident by the trouble he had in trying to cut away the tin fillings. I remember reading an article by Dr. Chase, of St. Louis, in 1869, advocating the placing of tin over sensitive dentine, in order to secure a gentle galvanic action; the galvanic action was said to be therapeutic, and hardened the teeth. I remember a case in which I tried it. I made a tin disk and adjusted it very nicely over the soft dentine, and proceeded to fill the tooth with gold. After removing the rubber-dam, I found the tin had slipped out to the margin and made a form like a crescent. It was for one of a family whose teeth were exceedingly soft; this was a very bad tooth, and was very sensitive at the time. I called the patient's attention to the fact, and watched that tooth with considerable care, and after three or four years I had to renew the fillings of teeth that had not been so lined, but this tooth was in a perfect condition, and it stands to-day since 1869, a perfect tooth at the cervical margin.

I am glad to give my testimony in behalf of tin foil.

DR. ALBERT H. BROCKWAY, Brooklyn, N. Y. I am especially pleased with this paper, but we must not forget we have a great variety of cavities to fill, in a great variety of situations, in a great variety of teeth of different characters, so that if you are to do the best thing for the patient, be extremely eclectic in practice. It is for us to determine what to use for a given case under given conditions. I am a strong believer in the use of tin foil in such cases as will admit of it; I use it more or less, and I use it for two reasons especially. The first is from its adaptability and facility with which a saving fill-

ing can be made in favorable cases; I am also inclined strongly to believe in its therapeutic properties. I am not so sure of this, but experience seems to bear it out. In soft chalky teeth, where the conditions are not favorable for tin, we have to resort to other materials. I use it especially in children's teeth, in cases where tin foil has been strongly recommended, and in which recommendation I quite agree; but there are many cases in children's teeth where it seems to me that tin foil could not be used so successfully as other materials, notably gutta-percha.

I wished simply to speak of the limitations of the usefulness of tin foil.

DR. GORDON WHITE, Nashville, Tenn. I claim for tin, after having used it for nine years, that it is the best filling-material that has yet been given our profession, excepting that it will not stand friction; I think it is the best tooth-preserver that we have. When I first used it I combined it with gold, and I found that the two foils worked very harshly in my hands; after using it a couple of years that way, I commenced to use the foils separately, covering the tin with gold. I find it works very much softer when the foils are introduced separately.

DR. C. S. STOCKTON, Newark, N. J. It is not necessary for me to go over the ground so well covered by Dr. Darby; but there are people who come to me who are unable to pay the large fees that are requisite where you would use gold. I recall two fillings that I saw only a short time since, which were put it twenty-three years ago I think. I filled those teeth by a plan recommended by Dr. Palmer, using mats of Abbey's soft foil packed up against the labial surfaces of the enamel, filling the balance of the teeth with tin foil. They are in as good condition to-day as they were twenty-three years ago. It is necessary and right to save the teeth of those who are not able to pay the large expense of gold-work, and if we have a material that will save teeth it seems to me it is our duty to use it. Tin is one of the best materials for saving teeth, and we should use it more than we do.

DR. ST. GEORGE ELLIOTT, London, Eng. It is to me a very great pleasure to return to this country and find that tin is at least beginning to have a large number of advocates. In Europe we all look upon Dr. Abbot, in Berlin, as the father of modern dentistry there; he was one of the earliest, though not the first, to use tin foil, and he did so very successfully; he carried it out in his own practice, and his son-in-law, Dr. Miller, took it up, as did also Dr. Jenkins, of Dresden. For ten years I have used it very largely; I have averaged from four to five or six fillings a day. The greatest

advantage of tin and gold has not been spoken of; you know if you get a preparation of tin and gold in correct proportions there is practically a chemical union between the two, and you get not only hardness but a certain amount of expansion. It is exceedingly valuable in filling crown cavities of molars. Its hardness is not immediately gotten; it takes from one to three years to harden. Its color is its disadvantage; it approaches that of amalgam. If you will use certain proportions you get a better color, but you get it at the expense of hardness.

PROF. JAMES TRUMAN, Philadelphia, Pa. It is with a great deal of gratification that I find even at this late day, after forty years of practice in the use of tin foil, that it is coming up again with honor. I have long been satisfied that the profession has lost much in the abandonment of this material; perhaps the reason has been largely due to the fact that tin foil originally, as my friend Dr. Darby said, was not well made; then again, less attention was paid to having the surfaces clean, and also from the fact that very few who practiced with this material used it as I would, that is strictly upon the cohesive principle. In using the tin foil on the soft gold plan, it is necessary as far as my observation goes that the foil be packed in the cavity as solidly as gold. When this is accomplished, you have a filling that will resist mastication upon any surface. I have tested this for years, and I find that masticating surfaces filled with this character of material last from twenty to twenty-five years perfectly. The therapeutic properties of tin foil have been spoken of, and I believe there is a chemical action on the tooth-structure, but what that is I am not prepared to say. You will find tin foil much better adapted for use in the case of soft teeth. It has been asserted that it is better for children's teeth, but I would place it in all teeth except the anterior teeth; they can be better filled with it where the teeth are of soft character than with any other filling. Instead of using so much amalgam as we do, take tin, and it will be found more useful than gold in many respects. I agree with my friend in regard to its use at the cervical border. I remember in Dresden, in Dr. Jenkins's office he said to me, "I cannot, as some other men do, preserve the cervical border of teeth with gold, and therefore I invariably use tin and gold."

One word in regard to tin and gold. I have used it a good deal, and have seen Dr. Abbot operate with it in Berlin, and I know a good deal about Dr. Miller's use of it, and I am satisfied that it is a most valuable combination. It can be placed in wet, and if it is placed in wet it is better than when dry, owing to the action of the

fluids of the mouth producing galvanic action between the two metals, that produces hardness. I remember once I had occasion to remove an anterior approximal filling of Dr. Abbot's, and I found that the tin and gold was as hard as any amalgam filling I ever saw, and I had great difficulty in cutting it out. That was due to galvanic action between the two metals. I feel gratified that this matter has come up this afternoon.

DR. JARVIE, Chairman. A question is asked if tin is cohesive under water.

DR. TRUMAN. Not very well, but I have filled cavities under water. If you make a filling from shavings, you get the most cohesive property possible.

DR. A. W. FREEMAN, Chicago, Ill. None have yet spoken of finishing tin foil with gold, that I remember. I fill approximal cavities nearly full or three-fourths full oftentimes with tin and gold or tin alone, and then finish with gold, using sometimes first a little soft gold and then finishing with cohesive gold. If you have your masticating surfaces carefully prepared, and if you are careful about some little undercuts, you can very often make a filling that will be just as durable as any gold filling. I have been surprised in looking back over my experience for eight or nine years to see how tin and gold, finished with gold, has preserved the teeth. The first cases I remember to have had my attention drawn to were by Dr. Allport. He said he used cohesive gold on the outside; now we use more tin and less gold, but always wrap the tin on the inside of the gold.

I indorse the use of tin and gold, and especially do I believe in its chemical action.

The Section adjourned to 2.30 P.M., Wednesday.

SECTION VII.—PROSTHESIS AND ORTHODONTIA.

The Section was called to order at 2.30 P.M., by Dr. C. L. Goddard, San Francisco, Cal., who read his address.

Dr. V. H. Jackson, New York, read the following paper:

[This paper was very fully illustrated, Dr. Jackson having about forty drawings of appliances, and he also announced that models of many of the cases would be shown to the Section at another opportunity.]

METHOD OF CONSTRUCTING SPRING APPLIANCES FOR CORRECTING IRREGULARITIES OF THE TEETH.

A regulating appliance is an appliance for moving natural teeth that are out of the line of harmony into their proper position.

In constructing an appliance for this purpose, the first requisite is that it shall be sufficiently well anchored to withstand either

the constant or interrupted force necessary to correct the irregularity without being materially changed in its position. The comparative value of the different systems that have been presented for this purpose can only be satisfactorily understood by having had experience with each of them.

It is the purpose of this paper to introduce a system, the value of which when understood, will, in the author's opinion, supersede any other yet presented.

In this system the appliance is usually constructed of wire, with a base wire, which is so termed on account of its being the foundation portion of the regulating appliance, to which cribs that clasp the teeth for anchorage are attached, and also springs that are to cause pressure to correct the position of those teeth that are out of line.

In determining where the different wires of the appliance shall be extended, it is often advisable to use pieces of small copper wire, forming them on the model of the teeth, in the position in which it is intended the wires of the appliance shall be arranged when it is completed. In this manner a clear conception can be had of the effect of each spring.

The base wire can be made of any metal desired. Metal used for this purpose alone should not be springy, but stiff and unyielding. It can be made any shape, round, square, or flat. The round is usually preferred, as it can be re-formed by bending in any direction, while with the wire in any other shape it would be difficult to attain the same results.

In most cases rigidity is required, and the base wire should be made correspondingly large.

In preparing to make the clasps, or cribs, as I have previously termed them, that are to form the attachment to the teeth chosen for anchorage, a perfect plaster model of the teeth should first be made and carved, especially the gum portion, at the necks of the teeth to be used as anchors.

The crib is then made in the following manner: A thin piece of metal, which we will term a partial clasp, preferably of gold or German silver, or any other metal applicable, about No. 33 to 36 standard wire gauge (Brown & Sharp) in thickness, is hollowed and shaped to fit accurately the contour of one of the teeth that are to be used as anchors, and is arranged to press well up about the neck, and at the same time made to curve sufficiently over the prominences of the tooth toward the grinding-surface to prevent the appliance from pressing on the gum. The partial clasp is arranged on the side of the tooth to which the base wire is to be attached.

If adjoining teeth are to be used as anchors, partial clasps should be arranged on each so as to touch each other at the junction of the teeth.

A spring wire, about No. 22 standard wire gauge, or a little larger, as the case may require, is formed so that it will fit the labial side of the tooth with both ends passing over the arch at the junction with the adjoining teeth, and curved about the lingual side near the gum line, to rest on the metal described, but it should be made to fit loosely, so as not to injure the plaster model in removing it.

The wire is most easily formed by first bending it twice at right angles with a small-sized clasp-bender, leaving the width between the parallel sides equal to the antero-posterior width of the tooth to be clasped. The part that is to clasp the neck of the tooth is then so curved with clasp-benders that it will be perfectly adapted to the curve of the labial side of the tooth.

Both the parallel wires are then placed in the clasp-bender at proper distance from the curved portion, and bent nearly to a right angle to cause them to pass over the grinding-surface at the junction of the adjoining teeth, and again bent in the same manner, to extend toward the neck of the tooth on the opposite side. The ends are then bent toward each other near the gum line, so they will rest on the partial clasp previously described.

The clasping power of the crib depends much on the spring properties of the metal used for the springs. Piano-wire is at present the most efficient, although spring gold, German silver, and iridio-platinum wires are often utilized. When the appliance is adjusted in the mouth, proper pressure is applied by making the necessary changes with the clasp-bender.

The uniting of the metals of the crib to the base wire is accomplished by soldering either with soft solder or silver solder. Soft solder is used for attaching the parts constructed with piano-wire, which can be held in place on the model with the hand usually, and the soldering done with the soldering iron. When the iron is hot, a piece of solder sufficiently large to do all of the soldering at once is laid in contact with the metal, and the parts are fluxed by touching them with muriate of zinc. The soldering iron is then passed over the solder, which usually flows covering all the parts at once, and if only sufficient solder is used it will require no further polishing.

If silver solder is to be used, the parts should be held in position on the model and united with hard wax, after which they should be removed together, and invested sufficiently with plaster and sand to hold them in position while soldering. It is desirable

not to draw the temper of the metals in soldering, as it interferes with the spring properties. The parts can be carefully burnished, however, which will reproduce the spring properties to a degree.

The springs for moving the teeth can be formed in any shape desired. They are most easily attached to the base wire with the soft solder by first winding a narrow strip of thin metal, as tagger's tin, German silver, or copper, which have an affinity for the solder, around the base wire, and the end of the spring to be joined. The soldering is done with the soldering iron as described for joining the metals in the crib portion.

To save time and repetition, I will here explain how the force of the spring is to be modified. Pressure is increased by removing the appliance and bending the spring in the direction in which the force is desired. Thus, where a tooth is inside the normal line, the pressure of the spring is outward, and any increase of force is obtained by bending the spring accordingly. On the other hand, when a tooth is to be moved inward, the spring that extends to the outside of it is bent in that direction.

Usually, after the appliance is inserted in the mouth, I let it remain untouched for about three days, so that the patient may become accustomed to it. After that time, the pressure may be changed once a week, or oftener if desired. Of course much depends upon the character of each case. These principles apply to all the modifications of my system.

From experience it is found that a crib attachment to but one tooth on each side of the arch is sufficient to retain and anchor the appliance in a proportion equal to one-half or more of the cases treated for irregularity.

In young patients the second temporary molar, if firm in the arch, is usually utilized as an anchor, because of its shape; the rounded contour being especially favorable for attachment with the crib. From its position just in front of the first permanent molar, it receives sufficient support to insure good anchorage for moving the incisors forward, or spreading the arch, etc.

[NOTE.—The detailed description of the method as applied to the correction of typical and more commonly occurring forms of irregularities was given, in connection with an elaborate series of illustrative charts. These will appear in full in the Congress Transactions.—ED. DENTAL COSMOS.]

DISCUSSION.

Dr. Goddard said that Dr. Jackson had shown a great deal of ingenuity in this method of regulating teeth. His own use of piano-wire had led him to think well of it in such uses, but in some mouths

it would corrode. He asked Dr. Jackson how to avoid trouble from this. Dr. Jackson said that the trouble from corrosion commonly occurred at places where the wires joined, or where there are little depressions, and usually only in the case of patients who were not careful to keep their teeth and the appliance brushed.

In case the wire shows a tendency to corrode, see the patient more frequently, and see that it is kept bright. This can be done by scraping spots of rust off, till the surface is quite bright, when it will generally last as long as the necessity for it exists. It should be kept bright, even if necessary to polish it up every day.

He has given up plating the wires to protect them from rust, preferring to keep them clean and bright. Indeed, gold plating is of little value. The gold is too porous to prevent rust. Tinning is better, but he rarely uses it.

DR. J. ROLLO KNAPP, New Orleans, said that it seemed to him that the claim made by Dr. Jackson that any of these appliances could be easily removed and replaced by the patient was a claim that could not be substantiated in every case shown, and instanced the one described as a hook in the end of the wire, passing through an eye on a band surrounding the tooth.

DR. V. H. JACKSON in reply showed how by first removing the anchor band from the molar, the hook could easily be removed, and by reversing the movement the appliance could be readily replaced by any intelligent patient. There may be cases where it will be necessary to make an appliance that cannot be readily removed and replaced, but then we make it our duty to take care of it for the patient. He had found nothing so good as piano-wire, having tried gold wire and iridium and gold. These are good, but as soon as you apply heat to hard solder then you destroy all the spring and spoil the virtue of the wire.

DR. J. ROLLO KNAPP thought the removable regulating appliance would be as difficult to remove as some removable bridge-work which was very difficult for a dentist to take off, and especially for any dentist except the one who put it on.

DR. J. E. KEENER would like to ask Dr. Jackson a question or two:

1. Do you ever fail to move a cuspid? We all know that in the case of one well advanced in years it is very difficult to do this.

2. Do you rotate and at the same time and with the same appliance move the tooth backward or forward?

DR. JACKSON said that in regard to moving an incisor and at the same time rotating it, it requires only sufficient thought and study to devise and shape a spring so that by shortening or lengthening

a loop, motion can be diverted in any desired direction. Each case must be studied as to the peculiarities presented, and the appliance made to suit.

DR. PROSSER said that it seemed to him that these appliances, if worn for a long time, the pressure of the bands on the teeth would cause decay. He had had trouble in that way himself.

DR. V. H. JACKSON said that he had not answered the question about moving the cuspids. He had never had any difficulty in moving a cuspid with spring pressure. All that is necessary is to be sure your anchorage will not slip, and then if your spring is not strong enough, apply a stronger spring.

Of course we all know that continued contact of metal bands will cause decay in any tooth if it is left so that particles of food will be left where it will putrefy, but the danger will be reduced to a minimum by care as to cleanliness.

DR. E. MARSHALL SMITH said that the question as to the decay of the teeth was not properly understood by Dr. Jackson. He thought the greatest factor of decay in such cases was in the bands which were cemented to the teeth.

DR. V. H. JACKSON said there was no reason why such collars should cause decay unless there was a vacancy between the band and the tooth that the cement had not filled, and when food would remain and by its putrefactive changes would start the decay. He had had such trouble, but was exceedingly careful now and did not have so much difficulty.

DR. H. W. ALLWINE. There are some cases in which it is necessary to put the appliance on so that the patient cannot remove it. Especially in the mouth of a patient whom I could not trust, I would use a cap instead of a band.

DR. V. H. JACKSON said he did not prefer caps, as they sometimes caused the opening of the bite, and he considered it very necessary to keep the teeth in exactly the natural position.

DR. M. F. FINLEY, of Washington, said that the system of regulating had been made more clear to him by the author than it had ever been before. He would make a suggestion and ask him to investigate it. At the recent accident at Ford's Theatre, there were several cases of broken jaws; the physician under whose care they came had spoken to him of the difficulty of finding binding wire strong enough and thin enough to pass between the teeth to bind the parts together. A gentleman connected with the navy had spoken of nickel-steel wire, and he hoped that Dr. Jackson would get some and apply it to this purpose, as it would not rust.

DR. JACKSON said he had corresponded with steel manufacturers,

and had got the address of the manufacturers of nickel-steel, and expected to have an opportunity to report on the use of this wire shortly after his return home.

DR. E. M. S. FERNANDEZ, Chicago, thought the paper was invaluable, but he differed with it on two or three practical points. He disapproved of letting any patient know how to take the regulating appliance out, because, especially in the case of children, if they can remove it, they will do so, and only return it when they come to see the dentist. In this way the appliance will not do any good, and the dentist will get the blame for the failure.

As to cleaning the rust from steel wire, his way is to throw it into alcohol. He learns this from seeing a piano-tuner clean the rust from the wires of a piano, and now he always throws every such appliance into alcohol whenever he removes it from the mouth. Then brush it off with soap and water, and the appliance will not rust readily again.

DR. C. S. CASE, Chicago, had known of Dr. Jackson's system for some time, and it is very possible, if he was as well posted in that method as Dr. Jackson, he might think better of it. It is a matter of habit. We naturally feel our way is the best. If we go beyond the methods we are using, we may find much good in other ways. In correcting irregularities of the teeth, the difficulty is not to get force enough to move the tooth, but to decide what is the best method to move it, and how we can get our appliances into shape to move the tooth in the way we desire. Sometimes it is desirable merely to tip a tooth out or in. Then we will have an easy and simple task, but if we would move the tooth bodily, or tip it by moving the root, then we must have the bands attached so firmly as to hold the tooth in the position we want to have it retain. He did not desire his patients to remove any appliances for regulating.

He also had had difficulty in preventing oxidizing in the mouth, and had gone so far as to have the wires cut into lengths, the ends rounded, and the wire gold-plated, but still there would be rust. Now, he uses German silver wire, extra hard, and drawn down till it becomes so stiff and rigid that if it was bent very far, it would break like steel wire will. If you take good German silver wire, No. 12 English standard gauge, and without annealing it, draw it down till it is No. 24, you will have a wire with all the power needed for rotating teeth, and that is all he ever uses the spring of wire for. He prefers the positive method of intermitting pressure of jack-screws.

DR. C. L. BOYD asked Dr. Jackson if he had said that he did not care to make any change in the bite in any case.

DR. JACKSON answered he did not in the majority of cases.

DR. BOYD said in his community it was very common to have the bite too short, and in many cases it would be better while regulating, if we could raise the bite and allow the teeth to grow out of the jaw. We could then grind them down to the proper bite.

DR. C. G. MYERS, of Galveston, Texas, read the following paper:

A METHOD OF FUSING PORCELAIN FACING TO BACKING AND CAP.

The great objections to porcelain-faced crowns have been, in the past, the liability of the facing to fracture and lack of cleanliness. To overcome these defects I have succeeded in fusing in the porcelain facing to the backing and also to the cap at the time of soldering.

The material employed is the white enamel used by jewelers in ornamenting gold. This comes in lumps almost as hard as flint, and is reduced to an impalpable powder by grinding in water in an agate mortar and afterward washing thoroughly. After fitting the thin pure gold backing as accurately as possible to the facing, remove backing, and with a fine-pointed brush place a small quantity of the enamel; mix with water to the consistency of cream on back of the facing, but do not let it come in contact with the pins. Replace the backing, and bend pins slightly to hold it in place. Then place facing on asbestos, and flow up backing with solder. The heat required to flow solder will also flow the enamel, forming a perfect union between porcelain and gold. In like manner the enamel may be used to fill space between facing and cap, and when soldered it will form a perfectly cleanly as well as strong piece of work.

The enamel can also be used in gold plate-work when the teeth are to be soldered to plate, thereby doing away with the uncleanly joints so often found. By removing the objectionable features of work we thereby widen its scope.

In this short paper I have tried to give you the result of some experiments I have been carrying on for several months. If they can be of any service to you, our time has not been vainly spent.

Adjourned at 5 P.M. till to-morrow at 12.30.

SECTION VIII—EDUCATION, LEGISLATION, AND LITERATURE.

The Section was called to order at 2.45 P.M. by the chairman, J. J. R. Patrick, D.D.S., of Belleville, Ill.

Papers by P. Macarovici, M.D., Jassy, Roumania, subject, "On the Status of the Art of Dentistry and of Dentists in Roumania," and by Frank W. Sage, D.D.S., of Cincinnati, O., subject, "The Editorial Function in Dental Journalism," were read by the secretary of the Section. Abstracts follow:

THE EDITORIAL FUNCTION IN DENTAL JOURNALISM.

The history of dental literature offers a vast accumulation of matter from writers of all degrees of attainments. In the earlier journals one is impressed by the discovery that everything not actually foreign to dentistry was accepted as "grist" for the mill. Nor has time altogether removed this feature of dental journalism. The most obscure member of the profession, with no marked command of language, and even a trifle "short" on ideas, has been welcomed, repelled by no editorial intimation that his contribution was not fully as worthy of the reader's attention as those by the most famous names in dental literature. Seeing himself in print, he found that it was in his power to place the editor of the dental journal under obligation to him, by sending him something to help fill its pages. Had he not detected indications of a paucity of contributions, requiring a supplementing of vain efforts to meet the crying need, by cullings from medical exchanges? He had penetration enough to perceive that page after page in the journals was often loaded with swelling phrases which meant nothing in particular, or were not infrequently mere paraphrases of familiar passages to be found in standard dental works. The prosiest writers on the tritest subjects appeared to find no difficulty in getting into the journals. He had all along entertained a suspicion that dental editors are individuals whose duty it is to see to it that their journals are sustained as long as possible from falling by the wayside. He discovered great eagerness on the part of the editors to publish papers without question as to their character or worth; that it was an editor who suggested the employment of a stenographer to report the discussions, and that he insisted on having a full, copious report made. Then, when a month later he saw the report in print, there were the exact words published without revision or emendation. It appeared to be with this same editor a matter of duty, admitting of no question, to promulgate on the printed page the wildest theories, the baldest specula-

tions, of Smith, Brown, *et al.*, since those theories and speculations had furnished a theme for discussion in the convention, and discussion is the life both of the convention and of the journal. And since the conventions are thrown open to whosoever chooses to use the opportunity to announce and defend some pet theory, by what authority may the editor reject from his journal that which the conventions have thought not unworthy to be discussed? Moreover, since the editor usually disclaims responsibility, why, the obscure contributor asked, should he feel it expressly incumbent upon him to point out errors?

As regards the responsibility of the editors for this condition of affairs, it may be properly urged that at least they have not exhibited excessive pride in the work thus imperfectly accomplished. There seems to have been no alternative for them but to await passively the coming of the long-promised time, when through the influx into our profession of educated men, trained to reflect, to analyze, to formulate ideas, these evils should correct themselves. Eminent men in the profession, editors and others, years ago called attention to the fact that our literature is not of the high order which should characterize a profession so progressive, in other respects, as ours. No one, to our knowledge, has however suggested the expediency of the editors themselves taking a higher stand, so as to be in a position to stimulate contributors to worthier efforts.

Let us consider what seems to be the function of the dental editor. Looking through volumes of five of our dental journals, we find about one page of strictly editorial matter to every fifteen pages of other matter. We have excluded book-notices, obituaries, abstracts, comments in parentheses (passing comments), foot-notes; in short, all matter not made strictly the subject of a separate editorial article, our object being to ascertain to what extent editors of our journals are entitled to distinction as *editorial writers*, not as mere compilers and annotators. In the secular press the men who give the paper widespread reputation and influence are primarily the writers of the leaders. The purpose of our inquiry is to show that editorials are essential to the fullest measure of success in our journals. Is it true that the real strength and influence of our dental editors appertains to their writings—as *editors*? Have they not invariably made their reputations as dentists, as lecturers in colleges, as debaters, as essayists, before they came to occupy the editorial chair? Is not dependence for whatever of influence or authority they may hope to exert, as the heads of their respective journals, placed more particularly upon that reputation than upon their presumed skill as writers?

This is not an arraignment of our capable dental editors. There seems, now, however, to be a call for certain improvements. It will not do to under-rate the critical faculty of the average reader. The man who yawns, and skips an article before he has fairly dipped into it, usually has a reason for so doing, unable though he may be to state his reason in more explicit terms than that the article fails in interest. At a glance we detect obscurities, the effect of faults in the writer's style, and our condemnation is as infallibly just as if we had lingered longer, and defined them minutely. There are by no means rare defects in dental contributions which often obviously contain valuable and instructive ideas; a common fault is failure to present ideas in their natural order of sequence, so that the reader becomes hopelessly confused in the effort to follow and connect them. These faults in style call for editorial revision. We find them even in our standard text-books.

Since the success of a treatise on dental subjects is so largely dependent upon clearness of style and diction, it should be thoroughly revised by some one thoroughly conversant with the art of composition, and familiar with the subject-matter. Who shall this person be, if not the dental editor? But each one claims the right to be a law unto himself. If this be true, it is *prima facie* evidence that our editors are not sufficiently respected as literary authorities. Nothing in all the past experience of the dental author justifies a doubt that he is competent to carry through to successful completion a work which, in his conception, is nothing more than a series of papers such as he has often read, with applause, before dental associations. He has always been welcomed by associations and conventions. No board of censors has met him on the threshold, asserting its right to examine his MS. and pronounce judgment on its fitness to be read before the assembly of his professional confrères. The clearness of some of his statements is called in question when the paper is read, but even this does not suggest to the author that his paper needs revision. There is, however, some excuse for this. The oversight is doubtless often due to a too ready assumption on the author's part that these inquiries are of the nature of a challenge directed at the fallacy of assertions or propositions stated; whereas the author has failed, though unskillful use of words, to render his meaning intelligible. These faults of course mar the perfection of his work on the printed page, as well. Hence valuable time is wasted in the convention, and valuable space in the journal in elucidating his meaning. The reader, unable to understand his meaning, may omit entirely to read the discussion which follows, through premature failure of interest in the subject.

It seems that readers of papers in our conventions are seldom conscious of being criticised as to their literary style—faults of omission and commission—by fellow-members. The members themselves, singularly enough, are not conscious of being, in a literary sense, critical. This forcibly suggests a need of some one's doing the work of revising. Again, why not our editors? The editors of the great secular magazines do not hesitate to suggest, even to writers of distinction, changes in MSS. submitted to them. True, they stand in an exceptionally independent attitude. Few authors feel that they can afford to ignore the publisher's suggestions. Publishers are supposed to know best what the public want. Authors usually defer to their opinions.

Now, why should not the same deference be made to the opinions of dental editors? Why should they not be sought out and consulted in this matter of deciding what amendments are required in any manuscript which it is proposed to print and bring to the profession's notice, soliciting purchase? Probably, because the editors have not arrogated to themselves any such prerogative. Quite as probably for the reason that writers have regarded their productions with too much complacency. No one has ever ventured to call their attention to literary faults.

Has the time arrived for dental editors to take a higher stand in this matter? Will it not be demanded of them by their readers, in the near future? Shall we not have a Board of Censors to pass judgment upon papers submitted for reading in our dental conventions?

What would be the probable effect of putting into operation this double suggestion? First, the contributor would be stimulated to self-improvement as a writer. Secondly, the editor would be put upon his mettle, and possibly stimulated to more worthy effort in his own writing. It would further serve to create a distinction between such journals as aspire to lead and instruct their readers, and others which are obviously mere mediums for advertising dental wares. It would undoubtedly increase the journals' circulation, for unquestionably the improvement would not be overlooked by the most casual reader. It would rid the journals of the rubbish which occasionally cumbered their pages; weakly sentimentality and vapid utterances which savor of sanctimony, and which "speak the vacant mind," would disappear, to the relief of the sensible reader. It would pique the rising generation of dentists, young men of a higher grade of intelligence than in years past honored our profession in any considerable numbers, by their preference to make their mark as writers. The effect at first might be to check production. That

might not be an unmixed evil. Let us cut out all irrelevant matter from our journals; let us put a premium on brains, and then trust the future for results.

Place a few salutary restrictions upon contributors. Pay something for contributions. Payment for an article is a guarantee of real worth in the article accepted. It is the placing of a premium on the privilege of being admitted to the columns of the journal, and it is an assurance to the writer that acceptance of his article is not on the editor's part merely an act of gracious compliance with his desire to see himself in print.

This suggestion, we believe, would exert a salutary effect upon the minds of the great mass of subscribers to dental journals. They would read with more interest and care articles which they knew had been found worthy of purchase by the editor.

But of the dental editor as a reviewer and expositor. Shall we not have more exhaustive, systematic effort on his part, in recapitulating, at stated intervals, the important features of dental progress; the really valuable ideas adduced in our literature? First, with reference to book reviews. They are usually brief, frequently indeed only a dozen or so lines. Until quite recently, at least, the publication of any kind of a book bearing on dental subjects seems to have been regarded as an occasion for congratulation, as being an acquisition to the yawning gaps in our book-shelves. But of late we discover indications of a critical spirit on the part of one or two editors, as if they were not quite so ready as formerly to accept the mere fact of publication, as a guaranty of perfect work on the author's part. What more important service can the editor render the large and increasing number of purchasers of dental works, than to give them, in advance, an impartial judgment of their merits and defects alike? But to make such a report, the editor must read carefully not merely a page here and there, but whole chapters.

Dental literature has reached a stage of development where editorial safeguards can no longer be neglected without protest. A few of our text-books have too much "padding;" some reflect too conspicuously, and quite unnecessarily, the personality of their authors.

But it is in the published reports of discussions in our conventions that the need of editorial revision is most palpable. Many of these reports could be cut down one-third or one-half, with very desirable effect. The stenographer who understands his business ought to attend to that. The amended speech, from the reader's point of view, answers all practical purposes for which a report of discussion is supposed to provide.

This fault in reports is, happily, somewhat less commonly found to-day, in our best-conducted journals. Dental editors seem to be grasping the idea that their journals should be made acceptable to the general reader, as well as to those who contribute to the discussions and furnish papers. They are coming to understand that the reader wants the "gist" of the discussions. Of course much latitude must be allowed our extemporaneous speakers in conventions. It would take all the life out of our discussions if these men were made to feel that they must measure their words, to avoid every superfluous expression. They must be left untrammelled to range over the field of the subject, as the inspiration of the moment dictates. But the stenographer has only half learned his trade, who has not learned the futility of attempting, in every instance, to photograph in his report the spirit and "atmosphere" of the speakers' efforts. Much judgment in this matter is required of the stenographer.

The editor, who is present to listen, has an advantage over the stenographer. The mechanical execution of his task restricts the reporter to the mere matter of the *sound of words*, leaving him small opportunity to note their sense. After an experience of twenty years' short-hand reporting in dental conventions, the writer of this paper is of the opinion that but few speakers appear at an advantage in a verbatim report. They appear better in print in a synoptical report.

But of the editor as a writer, what more can we say than to plead for more earnest effort? It has been for years the fashion to say that there is nothing new to write about. This is not now, nor has it ever been, true. The quality of newness inheres in the writer who presents us a new picture—new in the sense of its being unlike the conventional pictures to which our vision has been accustomed.

It is, however, a difficult matter to say just what the editor should do, which has not been done. The editor needs to write more, if he would enjoy the full measure of honor appertaining to his office. At the present time, our journals are almost without exception joint-stock concerns, in a sense unsuspected by their editors. Every contributor of an article is admitted to a plane of equality with the editor, so far at least as the reader can perceive. Let us hold up the hands of the editor and make him the central figure, let us concede to him the right and privilege of infusing more of his individual spirit into the journal, even if it be at the expense of the contributor's idea of what the reader wants. Thus shall we accomplish the desired object of conferring upon the journal a distinctive character

calculated to extend the range of its influence and fix the standard of its authority.

ON THE STATE OF THE ART OF DENTISTRY AND OF DENTISTS IN ROUMANIA.

On my return to my country from abroad in 1882, I was possessed of a desire to become acquainted with whatever contributions to the art and practice of dentistry had appeared in the language of Roumania. I perused the *Progresul Medical Roman* for a period of three years, finding almost nothing. Equally futile were my researches in the library of Jassy.

I made a request of the editor of the journal *Spitalul*, that he refer me to every publication upon dental art and practice with which he might be acquainted in the Roumanian language. Dr. Vasilesan replied that he had been unable to find anything bearing on the subject of dentistry in the literature of Roumania.

Being convinced that a dental society for the purpose of mutual interchange of ideas would do much to awaken among us an interest which had become dormant in the study of our art, I took the initiative in the establishment of such an association.

On the third of April, 1890, my efforts were rewarded in the assemblage of the dentists of this place in the hall of the University, and the founding of the Chirurgico-Dental Association. The articles for the government and conduct of this association were drawn up with the greatest care, having specially in view to attract every dentist who was filled with love for his profession, as may be seen from Article 2, as follows:

"ART. 2. The association founded for the purpose of furthering advancement and diffusing the chirurgico-dental science in the Roumanian language. This end is sought to be accomplished,

"(a.) By the establishment of a special school of dentistry as soon as the means shall be forthcoming, in which lectures shall be delivered on dental surgery and technique.

"(b.) By the collection of specimens and the founding of a museum illustrating the various departments of dental surgery and technique.

"(c.) By the collection of literary works looking to the establishment of a dental library—the same to be at the disposal of the students of the school, of the members of the society, and of the general public.

"(d.) By the publication of a journal devoted to the interests of dentistry, with the title *Progresul-Chirurgico dentistice-romane*."

I felt bitter disappointment at the failure of my undertaking.

The cause of such failure was envy and pride on the one hand, and material and pecuniary difficulties on the other. The association of seventeen members had to be dissolved, and my colleagues have thus far not established another society.

Afterward I determined to lay bare in a small book to the public my own modest dental acquirements, and experience gained by personal observation. I had hoped through the publication of such a work to elevate the standing, which had sunk so low among us, of the profession of dentistry and of its representatives.

An evidence of the slight degree of confidence which the Roumanian public reposes in dentistry may be gathered from the circumstance that the native dentists might exhibit mountains of human teeth, if the patients were not in the habit of demanding the same after extraction for preservation among their relics. Our patients will have nothing but extraction; of reimplantation, filling, or similar chirurgico-dental operations, there can be no question in our country, for even when we have succeeded after prolonged discussion in persuading a patient to submit to filling, he demands the impossible, namely, that the entire operation shall be concluded instantaneously.

Inasmuch as the rate of progress of a science, art, or industry is largely dependent upon the laws of a country bearing thereon, it will not be superfluous to consider our laws regulating the practice of dentistry.

Until the year 1888 our law (or custom) required that every person who professed the art of dentistry in our country should be able to show either a foreign diploma or should pass the "Subsurgical" examination. At this examination he was compelled to show that he had become practically acquainted, by a year's attendance in a hospital, with the following procedures and appliances: Venesection, leeching, blistering, clysters, cataplasms (fontanellen öffnen), vaccination, and the extraction of teeth. The candidate, besides, was required to be able to read and write. (Laws of 1881, collected by Dr. Zamfirescu, Medic. Primar Niamt.)

In places in which no dentists reside, the law grants permission to barbers ("subsurgeons") to extract teeth; and even in places where there are dentists, extraction of teeth is practiced by the barbers without hindrance, for the reason that the number of dentists possessed of a diploma is inadequate.

According to law, "Dentists are empowered to practice manipulations of surgical dentistry only. They are not permitted, unless they are also doctors of medicine, to give anesthetics, except with the assistance of a physician." The law makes no distinction

between dentists who possess a foreign diploma and such as have passed the above mentioned examination of the country.

On May 1, 1888, a new law regulating the practice of dentistry was promulgated; it is as follows:

"ART. I.—Besides doctors of surgery and of dental surgery, dentists possessed of diplomas from foreign chirurgico-dental schools, the same being attested by the Central Board of Sanitation, and those who have obtained the right to practice dentistry by a University examination, a class of dentists known as dentists of the second class are recognized.

"ART. II.—To become a dentist of the second class, the candidate must serve an apprenticeship of at least three years with a chirurgico-dentist who possesses a diploma (with academic grade) recognized in the country.

"On completion of this apprenticeship, the candidate is examined by a special examination board and receives a certificate as dentist of the second class.

"ART. III.—Pupils in the office of a surgeon-dentist are required to acquaint themselves with the general rules of the sanitary service.

"They must present certificates of having passed at least four classes of a secondary school.

"ART. IV.—The special examining board for the examination of a candidate for the grade of dentist of the second class is appointed by the general directors of the sanitary service, and shall consist of a representation of the central board of sanitation of a surgeon-dentist of the capital, of the general director of the sanitary service, and of a professor of the medical faculty belonging to the surgical or anatomical department and named by the dean of the faculty.

"ART. V.—The examination consists of three parts: written, oral, and practical on the cadaver. The written examination deals with some subject taken from dental anatomy, physiology, pathology, or from operative dental surgery," etc.

The promulgation of the law of 1888 is a source of great satisfaction to me, for this law, perhaps the work of Dr. Vasilesen, with whom, as mentioned, I had the honor of a correspondence, gives grounds to hope that our country may shortly be able to show more worthy representatives of the dental art than it now possesses.

There was no discussion on these papers, and the Section adjourned to meet at 2.30 P.M., Wednesday.

DEMONSTRATIONS AND CLINICS.

The demonstrations and clinics were held at 102 Michigan Ave., beginning at 9 A. M.

Dr. W. G. A. Bonwill demonstrated the use of his improved mechanical mallet, filling a sixth-year molar, using one and two-thirds books of gold, soft and cohesive, and restoring the contour of the crown in less than half an hour.

Dr. J. H. Wooley filled the roots of a tooth which is to have a crown put on it later. The tooth was a superior second molar, with the roots decayed to the bifurcation. After opening up the pulp-canals down to the apical foramen he volatilized alcohol by means of Dr. Small's canal-dryer, after which he used Richmond's hot-air cavity-dryer. To make certain that the cavities were thoroughly dry, he inserted in each the probe end of a root-dryer of his own design, his experience teaching him that it was unsafe to depend upon a hot-air cavity-dryer for drying the tooth as a whole or from crown to the end of the pulp-canals. You can usually succeed in getting the canals dry with the hot-air apparatus, but in some cases the insertion of a hot probe proves that the moisture is all driven off.

He next volatilized eucalyptol by the use of Richmond's hot-air cavity-dryer, for the purpose of permeating the tubuli with the vapor. Then he flooded the canals with the eucalyptol, allowing the root to absorb as much as possible. He then saturated the pulp-chamber with chloroform, working out all the air-bubbles with a broach. The roots were then filled with gutta-percha points, and he feeling sure that the chloroform had evaporated and that the roots were full of solid gutta-percha, the patient was dismissed for the day, to return to have the tooth crowned at another sitting.

Dr. H. N. Young exhibited drawings and casts of the jaws of a case of osteitis deformans, or acromegaly. This was shown and reported at the meeting of the Pennsylvania and New Jersey Societies two years ago.

Dr. Richards, of Knoxville, exhibited a set of artificial teeth which were found in an oyster-bed on the coast of North Carolina. An oyster had appropriated the teeth, though they did not seem to have been made for him. They did not fit.

Dr. C. E. Blake, of California, demonstrated the use of "muriatic ether" (ethyl chlorid) as a local anesthetic, and the use of his new gum-cutting and extracting forceps.

The method for using the anesthetic is to paint the gums, the teeth, and the adjacent parts with it thoroughly previous to extract-

ing. The insensibility is not always complete, but at least partial anesthesia is obtained.

Dr. C. Sill, of New York City, demonstrated the use of vaseline or other petroleum product for use to allay the irritation from the use of oxyphosphate and oxychlorid cements. He mixes it with the powder in the proportion of sixteen powder to one of vaseline, grinding up together carefully before adding the fluid. It absolutely prevents the irritation, and his experience teaches him that the usefulness of the filling is in no way impaired.

Among the articles exhibited were the following: The Hollingsworth Crown and Bridge System and Appliances. J. Austin Dunn exhibited the Dunn Syringe and the Dunn Hand Matrix. The Berry Electrical Dental Engine. L. E. Custer exhibited an electrical cabinet for running the electrical mallet, hot-air syringe, illuminator, etc. A collection of instruments manufactured in Japan, with the S. S. W. trade-mark on them. Buxbaum's Denti-meter. Pyrozone, by McKesson & Robbins. Harcourt's Dental Engine.

THIRD DAY—GENERAL SESSION.

THE session was called to order at 12 o'clock M., by the president, Dr. Shepard.

Drs. Godon and Ronnet were then introduced as representatives from France.

DR. GODON, in response to the greeting, read a short address, in which he said that when the dentists of France were first invited to the Congress, they did not dare to hope that the project could be so entirely successful as this gathering, upon which they extended their sincere felicitations. When men of all nations place in a common storehouse the studies they have made, the facts they have observed in different latitudes and surroundings, it can but produce the best results for the progress of their art and the benefit of humanity. When the government of France conferred upon his colleague, Dr. Ronnet, and himself the honor of an official mission to study the American dental schools and societies, they also accepted the duty of representing here the dentists of France. In conclusion, he invited those present to the International Dental Congress of Paris in 1900.

DR. F. J. CAPON, on being introduced as a representative from Canada, briefly returned his thanks for the welcome accorded him.

A paper by Dr. W. D. Miller, Berlin, Germany, was read by Dr. A. O. Hunt. An abstract of Dr. Miller's paper follows.

CONCERNING VARIOUS METHODS ADVOCATED FOR OBVIATING THE
NECESSITY OF EXTRACTING DEVITALIZED TOOTH-PULPS.

The practice now in vogue among good practitioners, of thoroughly removing the pulp and filling the root-canal to the apex, is usually so easily carried out in the incisors and cuspids, and gives such sure results, that there is no probability that a better method will ever be found. But when we extend this treatment to the bicuspid and molars, the labor and expense put it beyond the reach of the great majority of the human race, and the method is not always successful. It will consequently be a great boon if some means or method can be devised which would render unnecessary the removing of the pulp and filling the root-canals of molars.

While every dentist has now and then knowingly left remains of the pulp in narrow and tortuous canals, or in canals obstructed by calcific matter, and while many dentists in Europe have contented themselves with simply devitalizing the pulp, filling over it with amalgam and *leaving the rest to nature*, the first *systematic* attempt to do away entirely with the necessity of extracting the root-portions of the pulp appears to have been made by Witzel, who in 1874 presented the view that arsenious acid carefully applied to the inflamed pulp devitalized only the diseased tissue, and that by amputating the coronal portion twenty-four hours later, the ends of the root-stumps might be treated as healthy, freshly-exposed pulps.

Dr. Miller then presented briefly the methods devised by Witzel, Baume, and Herbst, the latter as put forth by its author and as modified by Bödecker, and summarized their advantages and disadvantages. Continuing, he said:

Perhaps the majority of dentists have also made more or less extensive use of the method recommended by Bödecker when they have left a portion or the whole of the pulp in the buccal roots of upper, or mesial root of lower molars, and filled directly over them, after thoroughly bathing with carbolic acid or some other antiseptic.

I have for a long time felt that the solution of the problem was to be sought for in the direction pointed out by Witzel, except that our efforts should be directed not to retaining the vitality of the root-stumps, but to preventing their subsequent decomposition by impregnating them with a suitable antiseptic. I am convinced that the success of the impregnation method depends to a very great extent upon the character of the antiseptic employed, and upon its chemical action upon the pulp apart from its antiseptic action.

The qualities desirable appear to me to be :

1. It must be a strong antiseptic.
2. It must be sufficiently soluble and diffusible to guarantee the impregnation of the whole pulp.

3. It must not be so diffusible that it will be completely taken up by the surrounding tissue and finally disappear altogether, as is the case with applications of carbolic acid. It is my impression that there is greater danger in too great solubility than in insolubility.

4. A coagulating action upon the tissue of the pulp appears desirable, though not absolutely essential. A pulp which is coagulated into a hard, insoluble body, is less likely to furnish nourishment for bacteria and offer irritation to the periapical tissue than one in a soft or semi-liquid condition. One cause of the failure of Baume's borax treatment is probably the conversion of the pulp into a liquid or semi-liquid, soapy mass with a strong alkaline smell and reaction, which can hardly be indifferent to the tissue about the foramen.

5. It is desirable that the substance employed have no irritating action upon the pericementum.

6. It should not discolor the tooth, although, as the treatment concerns chiefly molars, a slight discoloration need not be considered as a very serious matter.

7. Solid substances are better adapted to the purpose than liquids.

It is difficult to find a substance which fulfills all the above mentioned conditions.

According to the results obtained from over five hundred experiments, I have divided dental antiseptics into three groups:

1. Those possessing in a high degree the power of imparting antiseptic qualities to root-pulps, such as cyanide of mercury, bichlorid of mercury, diaphtherin, sulfate of copper, salicylate of mercury, oil of cinnamon, ortho-kresol, carbolic acid, trichlor-phenol, chlorid of zinc. The last four are, however, decidedly inferior to the others; they penetrate the pulp very rapidly, chlorid of zinc surprisingly so, but they are lacking in the necessary powerful antiseptic qualities, and are so diffusible that in the course of a few weeks they disappear altogether from the pulp.

2. Those of doubtful value: Thymol, salicylic acid, eugenol, campho-phenique, hydronaphthol, A and B naphthol, aceticotartrate of aluminum and some essential oils, resorcin, thallin, sulfo-carbolate of zinc, oil of birch, iodid of sodium, nitrate of sodium, etc.

3. Those nearly or quite worthless: Iodoform, basic anilin coloring-matters, borax, boracic acid, dermatol, euophen, chlorid of lime, peroxid of hydrogen, sozoiodol salts, iodol, tincture of iodine, spirits of camphor, naphthalin, etc.

The attempt to apply these results to practice was first made with the bichlorid of mercury, which has been used since 1890 in

some four hundred to five hundred cases, first in the form of small tablets, having the composition:

Sublimate, 0.01 gram;	Sublimate, 0.01;
	or
Boracic acid, 0.02 gram;	Common salt, 0.02.

The pulp having been completely devitalized, the pulp-chamber was thoroughly opened and cleansed, and a tablet applied and slightly crushed with an amalgam plugger, moistened with water and covered with a layer of tin foil (I now use gold foil), and the amalgam or cement filling immediately inserted. In about 30 per cent. of the cases severe pain occurred on the day following the application, and on account of this disagreeable symptoms these tablets were abandoned and the following substituted:

Sublimate, 0.0075 gram;
Thymol, 0.0075 "

These are applied in the same manner. The thymol being chiefly designed to prevent the sublimate being so rapidly absorbed, besides giving a greater permanency to the application, by reducing its solubility. Very seldom, so far, has pain followed the use of these tablets, while experiments out of the mouth show that they still possess sufficient penetrating power.

Another combination employed is:

Sublimate, 0.005 gram;
Thymol, 0.005 "
Tannin, 0.005 "

This combination is somewhat empirical, though the design of the tannin will be apparent to every one. The combination does not penetrate as rapidly as No. 2, and discolors the tooth more.

Cyanide of mercury has also been employed in combination with thymol, in the following form:

Cyanide of mercury, 0.0075 gram;
Thymol, 0.0075 "

Also the salicylate of mercury in the same form. This I think deserving of a trial. Its sparing solubility justifies the belief that its action will be more permanent than that of sublimate. The sulfate of copper may be used in pure form, but it naturally causes serious discoloration of the tooth at the neck, and is also, I fear, too soluble to give permanent results, in pure form. More recently, I have directed my experiments toward the discovery of some substance which possesses the desired qualities without discoloring the tooth. Thus far I have obtained the best results from diaphtherin (oxychinaseptol), an antiseptic recently introduced by Emmerich.

It may be applied in pure form. Among liquid antiseptics, the oil of cinnamon takes the first place, and I have much faith in its power to conserve the dead pulp. Like all the liquids, however, it is difficult to apply, and has, besides, the disagreeable quality of discoloring the tooth yellowish-brown. The combination which I have chiefly employed is that of sublimate and thymol. (I have not had opportunity to sufficiently test the others in practice, though I am now using, by way of experiment, the salicylate, and, to some extent, the cyanide of mercury.) It has been employed at the Dental Institute of the University of Berlin in over two hundred cases. Of these, only one failure has come to my knowledge.

Time is the only test for methods like those under consideration, and we can scarcely expect to arrive at a definite conclusion in less than five to ten years. Nor should we be hasty in the application of methods of this nature. One or two cases every month, at least for the first year or two, is all that a careful dentist ought to risk in private practice. Cases should be chosen which are very difficult to treat and which are otherwise frequently treated by the forceps, such as distal cavities of second or third molars, buccal cavities of third molars, etc. It is not possible at present to form a reliable estimate as to the value of this method of treating teeth; it may also be that much better materials will be found for the purpose than those suggested above. There are, at least, reasons for believing that by a careful application of this method, many teeth may be saved which otherwise would be sacrificed to the forceps, or, what is much worse, be allowed to crumble away.

[The president passed around for inspection two small bottles containing the preparations recommended by Dr. Miller.]

DISCUSSION.

DR. FRANK ABBOTT, New York City. I take entirely different views of this matter from the author of the paper and the gentlemen who have been quoted. The only one condition where I think of using any material for devitalizing the pulps of teeth, is where it is impossible to stop pain. I have perhaps in the last fifteen years used arsenic in teeth as many as three or four times, and no more. To detail to you how I avoid using arsenic and keep my patients along in a comfortable condition would be comparatively a long story. The line of treatment after devitalization, or of a tooth with a dead pulp, is a question of more importance, apparently, as borne upon by this paper, than any other.

For a number of years I have had a practice that seems from what has been said in reference to it, to be rather unique. I never depend upon the application of an antiseptic in the roots of teeth,

but upon a material which I force in and around such, with which is combined an antiseptic strong enough to answer the purpose, and virtually mummify all the material that is left in the canals of the tooth by its action. It surrounds and covers it over, and whatever portion of the pulp is left behind, is penetrated by the action of the chlorid of zinc and bichlorid of mercury that is mixed with it. Of course, if the pulps die, they die of their own accord. I have many dead teeth to handle and many to treat in my practice, as everyone has who is in full practice, and I treat them all in one general way. That way is to open the pulp-chamber as carefully as I can, so that I may cleanse it thoroughly of every particle and get thoroughly into all the root-canals. I then, with a very fine gold-pointed syringe, use a 1 in 10,000 solution of bichlorid of mercury—a grain of bichlorid of mercury in twenty ounces of water—and syringe out these canals just as thoroughly as I can; I then with a broach or small instrument penetrate into the canals as far as I can go, stir up the contents, and then wash again, repeating this until I am pretty sure that everything is clean, so that the substance coming out of the tooth as it strikes a white napkin will show a white, clean color instead of staining as when the canal is filled with dead material. When it is washed thoroughly clean I fill with oxychlorid of zinc, in which I put a drop of a solution of 1 in 2000 of bichlorid of mercury, thus combining the antiseptic properties of the bichlorid of mercury and the penetrating and antiseptic properties of the chlorid of zinc and oxid of zinc.

This is the material that mummifies or holds this substance that is left in the roots of the teeth, leaving it in a condition to give no trouble; and it may astonish some of you to know that instead of opening a tooth and treating it day after day for a week or more, I open a tooth and fill it at the same sitting always, unless I have periosteal irritation,—soreness of the tooth as I touch it. The crown of the tooth is filled with gold or any substance that I choose to use, of course, and I dismiss the patient after painting the gums carefully over with a solution of concentrated tincture of aconite root and tincture of iodine. That I always do before my patient leaves the chair. It is a powerful counter-irritant, and does the work of relieving the pressure around the root of the tooth. This to me is the simplest, easiest, and most quiet way of getting along with that kind of teeth.

It is the decomposition of the canal contents, and the gases accumulating from that decomposition all the time forcing themselves into the pulp-canal that cause the pain in such cases; the gases can not get outside because the cement upon the surface of

the root is living tissue, consequently all openings into the structure are closed to the escape of gas, except that which would be taken up in the circulation. In the other way, the opening is there so that all the gases pass into this pulp-canal.

In the substances that we use for root-filling, we must bear this in mind, that the results of decomposition are what we have to deal with, not the decomposition itself.

DR. GEORGE CUNNINGHAM, Cambridge, England. It is now some years ago since I had the opportunity of knowing what Prof. Miller was doing and of employing some of these tabloids. So far as cases of this kind are concerned they are limited, as Dr. Abbott has said. I have no doubt there is a certain percentage of failures. I am acquainted with Dr. Herbst's method of treatment, and I do not believe in his system of hermetic sealing. I support Prof. Miller's statement, which I believe is right, that we can get as good hermetic sealing by his process as by tin in the cavity.

I have tried the Herbst system with so-called "cobalt." Dr. Herbst kindly sent some to me, and my colleague, an eminent chemist, after examining it, said: "In that bottle you have enough arsenic to kill the whole British nation." Prof. Miller delivered an introductory course of lectures on operative dentistry, and showed these experiments in retaining the pulps alive by the cupric and sulfate method. I have used that method in wisdom-teeth. Of course, the alternative treatment is the forceps. If we could find for poor people some means which would shorten the treatment, I trust it will be the practice as used by Dr. Abbott, which will give the opportunity to fill at one sitting. I think the paper we have had today is of very great importance, because it has pointed out one way that we can bring our operations within the reach of larger numbers of the community.

DR. SCHREIER, of Vienna, addressed the Congress in German, and it was translated by Dr. Ottofy as follows:

It is indifferent what antiseptic is used; each one leads to the same result. It is only necessary to find material which is easily applicable. If any one says that he can take an antiseptic material and inject it into the fine canals, it is a matter which is impossible to comprehend. It is necessary that the material should be one which is readily introduced into the root-canal, and whose effect is prompt and immediate. Such a material Dr. Miller did not mention in his essay, but I have published a material of this character, potassium-sodium, which, on another occasion, I will present to the members of the Congress.

The paper was then referred to Section II, "Etiology, Pathology, and Bacteriology," for further discussion.

Various announcements were made, and the General Session adjourned till to-morrow at 12 M.

SECTION I.—ANATOMY AND HISTOLOGY.

The Section was called to order by Dr. R. R. Andrews, chairman.

Dr. S. H. Guilford, of Philadelphia, Pa., read the following paper:

THE TEETH AND HAIR; THEIR HOMOLGY AND PATHOLOGICAL INTIMACY.

Two opposite conditions are of especial interest to the scientific mind; one, the highest development of the individual; the other, some variation from the normal type. The first illustrates the perfect working of laws when not antagonized by adverse conditions, and the second how a variation may result from some slight disturbance of their operation.

One condition is as instructive as the other, for it is often only through the consideration of an abnormality that we are led to appreciate the harmony of co-ordinate parts and their adaption to function.

Perhaps no organs of the human body exhibit such a variety of aberration from the normal type and number as the teeth, and this fact further furnishes a field for observation and study. The subject is broadened and the interest intensified, when we consider the teeth in relation to other organs or structures with which they are intimately associated.

Of the epithelial products, the hair, next to the teeth, is the one that is most frequently found to be abnormally affected; and the fact that these two structures have often been found to be conjointly influenced, long ago attracted the attention of scientific observers, but seems never to have received the careful investigation that its importance demands.

In approaching this subject it will be necessary to first briefly consider the origin of each of these structures. The ovum of the vertebrates consists of a mass of protoplasmic matter contained in a connective-tissue envelope. By a process of segmentation the ovum produces a vast number of cells that form a membrane known as the blastoderm, and this eventually is resolved into three layers, respectively denominated the epiblast, mesoblast, and hypoblast. "From the epiblastic or upper layer are formed the epiderm or cuticle of the skin and all its appendages, such as the hair, nails, and enamel

of the teeth; also the brain and nerves. From the mesoblastic or middle layer are formed the true skin, cartilage, bones, muscles, dentine and cementum of the teeth, etc. From the hyperblastic layer are formed the epithelium of the mucous membrane and the various glands of the alimentary canal." (Cryer.)

Hairs are a product therefore of the epiblast, and are developed inside of pouches or sacs from the infant cells of the rete Malpighii which dip into the underlying corium. As they develop they push their way to the surface, attain their normal length, are shed, and again replaced by others. They are nourished by a formative organ known as the follicle.

Hair of varying length and fineness covers the entire external surface of the human body, with the exception of the soles of the feet, palms of the hands, the eyelids, the last phalanges of the fingers, and certain portions of the genital organs. Its greatest length is attained on the head, especially of the female, upon the cheeks, chin and upper lips of the male, and in the pubic and axillary regions of both sexes. Darwin says, "Hair is first developed in human fœtuses at about the third or fourth month, when it appears on the eyebrows and face and especially round the mouth, where it is much longer than on the head." At this early period of intra-uterine life no difference is noticeable between the male and the female fœtus in regard to the abundance or location of this growth, whereas in early childhood, and especially after puberty, the difference between the sexes in this respect is very apparent.

The downy growth of lanugo with which the human fœtus is covered is shed just before or at birth, and is succeeded by a less vigorous growth, which in the normal individual continues through life. This growth under peculiar abnormal conditions may be entirely lacking, or it may, in the case of "sports" or "freaks," attain an unusual length, owing to an excessive vitality of the follicles.

We believe all biologists agree that mammalian teeth, if not indeed the teeth of all the vertebrata, are developed in a sac or a pouch formed in part and in its earlier stages by a dipping down or invagination of the oral epithelium, which in time becomes the enamel-organ. That under this depressed epithelial layer a papilla arises from the corium beneath which the dentine is formed; the said papilla being eventually known as the dental pulp. The cementum is formed from what is known as the dental sacculus, a specialized product of the connective tissue which incloses both the enamel and dentinal organs, completely surrounding them.

Such being the origin of the tooth and its different tissues, are

we correct in calling the mammalian tooth a "dermal appendage"? The close relationship existing between the teeth of certain vertebrates and their dermal armature or scales is best seen in the shark, dog-fish, and other elasmobranch fishes.

Of the placoid scale of the shark, Greenbaur says: "The placoid scale has the structure of the dentine, is covered with enamel, and is continued at its base into a plate formed of osseous tissue; as they agree with the teeth in structure, they may be spoken of as dermal denticles."

Some of our best-known anatomists and physiologists consider the teeth as "specialized dermal appendages," which is accepted by biologists as reasonably conclusive. Each of the various blastodermic layers gives origin to a variety of tissues. Is it therefore not reasonable to suppose that where one tissue of a certain layer is pathologically affected, others of the same layer may also be? and if in a number of instances such is shown to be the case, is it not evident that all of these tissues have the same origin?

Instances are not wanting among the various species of vertebrata, where an abnormality in one product of the epiblastic layer is accompanied by a corresponding one in another of the same layer. We know that in the order of Edentata, in which some of the individuals are without teeth and others are lacking the normal number of their class, their integuments are also very variable in character.

In the hairless dogs of China and Japan the dental system is said to be greatly reduced, as compared with others of their class who have a normal hairy covering. The manatee or sea-cow, which is an herbivorous aquatic animal, having stiff hairs or bristles sparsely scattered over its skin, has a most peculiar and imperfect dentition, differing from any other species of mammalia.

Ascending the scale to man, we find many evidences of the same relationship between products of the epiblastic layer. In albinism the chief peculiarities are lack of coloring-matter in the skin and hair, and a pink iris. Both of these tissues are epiblastic products, and each is abnormally affected.

Within the past year the writer had the privilege of examining a family of hairless people from the interior of France, consisting of mother, daughter, and son. In each individual there was no hair upon the scalp, the fine down or lanugo usually covering the body was lacking, and the finger-nails were thick, narrow, and pointed, resembling the talons of a bird. The teeth, however, were normal in size, form, and number. Wilson mentions the case of a woman, aged thirty-three years, whose entire body was covered with thick

and long hair and who had never perspired. The abnormal growth of hair was not congenital, but began at puberty and remained. The same author speaks of the nails frequently showing evidences of abnormality in connection with either absence or superabundance of hair.

Dr. E. P. Bradbury, of Boston, reports the case of a man, aged twenty-four, who was edentulous and claimed never to have erupted any teeth. This peculiarity was accompanied by an entire absence of saliva. His tongue was dry and leathery, and his speech thick. He had never been able to take solid food of any kind, but subsisted on soups and soft food.

Coming now to the correlation of the hair and teeth, let us consider cases in which an abnormality of one tissue is accompanied by abnormality in the other. In some instances deficiency of one product is accompanied by deficiency in the other, whereas in others deficiency of one is associated with redundancy of the other. Of deficiency of both structures, the most notable instance on record and perhaps the only one of its character is that of a man whom the writer exhibited before certain medical and dental societies in Philadelphia in 1883, a full account of which, with genealogy and verification, may be found in the DENTAL COSMOS for March, 1883.

The individual was forty-eight years of age, and had never had any teeth, either temporary or permanent. His head was nearly bald, being only slightly covered with fine down; and while hair was present in the pubic and axillary regions, the surface of his body was entirely lacking in the surface-hairs and lanugo usually present. Owing either to the absence or suppression of the sudoriparous glands, he had never perspired. In addition to these peculiarities, he had no sense of smell and very little sense of taste, a combination of peculiarities which literally constitute him *sui generis*. He is still living and in good health, and of his six children only two (girls) show any signs of inherited abnormality, and then only in having about half the usual number of teeth.

Another case of somewhat similar character, but much less marked, is reported by M. Jarré, of Paris, a translation of which appears in the DENTAL COSMOS for June, 1892. The subject was a boy, twelve years of age, whose scalp had a scant covering of hair and whose body was entirely free from surface-hairs. His lower jaw was edentulous, and the upper jaw contained but five teeth. The finger-nails also presented an abnormal appearance, being covered with white spots and streaks.

Of the second class, in which deficiency or abnormality of the teeth or jaws is associated with excessive development of the hair,

there are several notable instances on record. One of these is the well-known case of Julia Pastrana, a Spanish ballet-dancer, who appeared in Europe many years ago. The hair upon her head was dark, coarse, and strong, while upon her cheeks and chin she wore a full beard several inches long. Her dentition was normal, as testified to by both M. Magitot and Sir John Tomes, who examined her mouth, but the alveolar and overlying soft tissues were hypertrophied to such an extent that only the coronal surfaces of the teeth were visible.

Another case, mentioned by Parreidt, is that of Krao, an Indian girl seven years of age, who was exhibited in Europe some years ago. Her body was covered with a well-developed growth of hair, and her jaws presented a hypertrophied condition, her teeth being normal in number and form. A more remarkable example, in which an abnormal growth of hair was associated with a deficiency of teeth, is that of Fedor Jeftichejew, the so-called dog-faced man, who has been exhibited the world over and whom your essayist had the privilege of examining less than a year ago. In his lower jaw there are three teeth, one cuspid and two incisors. In the upper jaw there are only two cuspids; one tooth, a lower incisor, having been extracted.

When first exhibited, Fedor was about three years old, and was accompanied by his father Audrian, who possessed the same peculiarities, but who has since died. Fedor, now a man twenty-three years of age, has his entire body covered with a fair growth of hair, while upon his face, including the nose and forehead, there is a strong growth of soft hair several inches in length. In his case also the sudoriparous glands seem to be poorly developed, for he perspires but little. Still another case of excessive hair-development, associated with a more or less defective development of the dental organs, is found in the "Burmese Hairy Family" exhibited at various times in this country and Europe. Three members of this family, the grandfather, the mother, and Moungh Phoset, the son, had their faces and bodies covered with long dark hair of a silky character. Their hands were not thus covered, but upon their foreheads, cheeks, noses, and ears the growth was excessively abundant.

That upon the forehead of Moungh Phoset was so long that it was parted in the middle and carried back and secured behind the head. The grandfather died in Ava, and was never on exhibition, but was seen and reported upon by Capt. Crawford, who states that "the hair on the face, ears, and nose was eight inches long, and on the breast and shoulders, four or five inches."

As to the lack of teeth in these cases, writers differ in their

accounts. Crawford says the mother lacked the cuspids and molars in each jaw; a later writer speaks of her as lacking many of the teeth, but as a matter of fact, Dr. John A. Daly, of Washington, D. C., in 1888, removed no less than fifteen teeth from her jaws.

Moung Phoset, the son, is reported as lacking many of his teeth, but this could neither be verified nor contradicted, inasmuch as the exhibitor in charge invariably refused to allow his mouth to be examined.

From the seven cases recited we see an absence or scanty covering of hair on the scalp, with entire absence of surface hairs on the body. With this in two cases there was deformity of the nails, and in two cases partial or entire absence of sudoriparous glands, and in one case a total lack of the sense of smell and an imperfect sense of taste.

In the four cases of excessive hair-development we find in two cases the normal number of teeth, with hypertrophy of the alveolar process and gum-tissues; in one case we find only six teeth *in situ*, while in the last we have no true record of the dental organs.

But there is another source from which we can derive evidence of the intimate relation of these tissues, and one seldom alluded to, that of ovarian cysts. In these aberrations of structure, which Wilson speaks of as "normal tissues abnormally placed," there are usually found hair, teeth, alveolar tissue, and sometimes nails; all products of the epiblastic and mesoblastic layers.

Prof. Roswell Park says: "Such products arise from isolated portions of the epiblast or mesoblast, or both, which during the development of the embryo have been displaced and located somewhere where they do not properly belong." Such islands of tissue retain nearly all their embryonal possibilities, and, given an impetus, develop into any or all of the tissues which they might normally produce.

In view of these facts, the question naturally suggests itself, "Why should these two particular products of the epiderm so often be found to be conjointly affected?" A satisfactory answer has never been and cannot now be given, but the consideration of two points may shed some little light on the subject.

First, the development of the hair and teeth in the human embryo are more nearly contemporaneous than that of the other epidermoid tissues, the first covering of hair or lanugo being noticeable about the fourth month of foetal life, and the formation of the dentine cap or calcification occurring, according to Magitot, at the same period.

Second, the homology of the two structures is strikingly illustrated (*a*) in their being developed within a sac formed by the dip-

ping down and infolding of the epithelium ; (*b*) in their being first formed and afterwards nourished by a papilla or follicle ; (*c*) in their limitation of growth ; (*d*) in their being shed and replaced, once or oftener, by structures of similar character ; and (*e*) in being so commonly found associated in dermoid cysts. We are therefore justified in concluding :

First, That where one product of the epithelial layer is abnormally affected, one or more of the other products of the same layer are also apt to be.

Second, That the two most commonly affected are the hair and the teeth.

Third, That this is shown by numerous examples throughout the vertebrata, including man.

Fourth, That the intimacy between these two products is probably due to the contemporaneousness of their inception, as well as to many points of similarity in their character and growth.

Fifth, That when thus co-ordinately affected, the manifestations are not uniform but variable.

Sixth, That this variability cannot be accounted for in the light of present knowledge.

At the conclusion of the reading of his paper, Dr. Guilford said: I have here a few models ; one of the jaws from which the photograph of the individual who never had any teeth, was taken. Another does not strictly belong to the subject, but I brought it as a curiosity,—where the teeth were all in place, but the crowns not being covered by enamel, wore away rapidly. It is one of Dr. Stainton's specimens. Here is another case which might be passed around as that of an individual who was entirely edentulous. Wherever a case of this kind is reported it is generally reported incorrectly. I found people who knew this person from childhood and testified to the facts. I also found his immediate relatives and traced his ancestry back for three generations. I traveled one hundred miles or more to see him, and these are the models of his jaws. When I saw him he did not have any teeth, but it was not true that he never had any. The appearance of the alveolar processes does not differ from that of an individual who has had all his teeth extracted.

DISCUSSION.

DR. A. H. THOMPSON, Topeka, Kan. There has been such a limited amount of observation and record in regard to this complicated subject that very little can be said about the law that may govern the correlated variation, and nothing can be said as to the

real law. Darwin was perhaps the first to notice the variation and abnormality of teeth and hair together. Of course the teeth and hair, both being dermal structures, are liable to be varied together, where there is any abnormality of development, whether pathological or not. There is something peculiar about that to which Dr. Guilford has referred. While we call teeth dermal structures, we know that they are not entirely so. The dentine is certainly an osseous structure; so that it is quite a question whether we are justified in calling the teeth, as a whole, dermal structures. I had a case once in which some of the teeth were absent, but there was very little variation in the hair except that the man was almost beardless. Cases of that sort would be valuable contributions to the subject.

DR. W. XAVIER SUDDUTH, Minneapolis. Apropos of this subject I have one case of an individual who came under my notice several years ago, where there was a lack of development of the sudorific glands. The temporary teeth also were quite faulty as to form and quality. There was almost entire absence of hair over the greater portion of the body, and that on the scalp was very sparse and of poor quality. Strange to say, however, the permanent teeth were well developed, normal as to number and quality. This case evidently was one where the fault lay in some nutritive disturbance about the sixth week of intra-uterine life, when the hair and teeth begin their development; the individual after arriving at maturity had overcome this disturbance and developed a second set of teeth normally. The case was plainly one of nutritive disturbance at that time. We have not enough cases on record to formulate any law regarding this peculiar phase of abnormal development. There is no regularity in the disturbance of the hair and teeth. In some of the cases cited the teeth were fairly normal and the hair was abnormal; in others, the hair was normal and the teeth abnormal. There can be no question about the homologous relation between the hair and the teeth. I think that there was a time in the history of the evolution of the teeth when they were not as perfect as at present, when they could have been classified more nearly as scales or dermal appendages.

DR. FRANK ABBOTT, New York. I do not understand that the teeth as such are of dermal epithelial production. It is the enamel of the tooth that is of epithelial production, the other portions being of a different structure and from a different source. What will affect the development of the enamel of the tooth, may readily affect the development of the hair-follicles, the epithelial portion of the hair and the teeth being affected simultaneously. Defective enamel in a tooth is produced by some disease of the epithelium, affecting the enamel-organ, and

causing deterioration or cessation in the production of enamel. Millions of hair-follicles may be affected by the same disturbance or a different one. If we always found people having no hair and without teeth, we could say one cause produced both conditions; but we find persons with diseases of the mouth affecting the development of the teeth, and no disease of the scalp or any portion of the body to affect the development of the hair, and *vice versa*. No doubt all variations of this kind are due to dermal disturbances during the intra-uterine period, as in the instance referred to, the mouth in which is wonderfully developed for a person who never had any teeth. I have a patient now who has seven teeth in one jaw and six in the other, and there never have been any incisors in her mouth.

DR. A. H. THOMPSON, Topeka, Kan. In the lower animals the teeth are entirely osseous, and quite identical with the bones of the skeleton and jaw. As we advance in the scale of development, the enamel is added to the osseous structure or dentine.

DR. SUDDUTH. In the development of teeth the development of the enamel-organ must invariably precede the osseous. The history of the teeth and the hair is identical, both beginning at the same time—the sixth week of intra-uterine life. The epithelial buds must be there both for the hair and the teeth.

DR. FRANK ABBOTT, New York, then read a paper entitled "Teeth of the Lower Jaw at Birth," of which an abstract follows:

TEETH OF THE LOWER JAW AT BIRTH.

Heitzmann and Bödecker in their (*Independent Prac.*, Vols. VII-IX) "Contributions to the History of the Development of Teeth," brought their researches up to the ninth month of foetal life. I have followed these studies up to the time of birth, in order to ascertain at this period the progress of development of the temporary as well as the permanent teeth during the last months of foetal life. Two lower jaws of apparently well-developed new-born babes were excised soon after death, stripped of their soft tissue, and placed for preservation into alcohol. Afterward they were placed in a one-half of one per cent. solution of chromic acid for the purpose of decalcifying the hard tissues, and at the same time to preserve the soft structures. I call attention especially to this method, since it has proven in our hands to be the safest for the preservation of the teeth.

Previous descriptions of developing teeth have been questioned in Germany, on the ground that the preservation of the tissues was not thoroughly done. After repeated renewals of the chromic-acid solution, the jaws were supposed to have become soft enough to be

cut with a razor; but it was found that the central portions after they had been cut up into blocks, were still hard and had to be again immersed in the chromic-acid solution, for the completion of the decalcification. The blocks had been obtained from the right half of each of the jaws, and were cut radiatingly, in order to obtain antero-posterior, vertical sections. The blocks were imbedded in celloidin, sliced into thin sections, and each section numbered with the utmost care, in order to keep the succession of the teeth unbroken. Thus the section could be examined and those selected for mounting which contained teeth, or features belonging to the process of the development of teeth. The sum total of the sections thus obtained, was one hundred and twenty-five. Out of these, again, only those were selected for study and drawing which showed the teeth in the greatest perfection, the most central section being selected for drawing.

Before entering into the description of the teeth, I wish to say that one of the jaw-bones, under the microscope, was found to be slightly rachitic, as proven by some scanty islands of hyaline cartilage found in the bone-tissue; though the baby was to all appearances normal. Previous observations have established the fact that congenital rachitis is first shown under the microscope by a retardation of development of bone-tissue in the lower jaw, before any abnormal systems appear to the naked eye, either on the skull or shaft-bones. It is evident that in this case the rachitic process has caused a slight delay in the formation of dentine and enamel. This assertion is clearly established by a comparison with the sections from the second jaw, in which there was not the slightest symptom of rachitis. The best specimens, however, and most of the drawings, were obtained from the first jaw. The slight deficiency in the deposition of lime-salts enabled me to obtain nearly perfect sections, whereas nearly all of the sections of the second jaw were very imperfect.

Another difficulty arose; as before stated, all the sections were made in an antero-posterior vertical direction. Some of the temporary, and most of the permanent front teeth are, as is well known, irregular, or devious within the jaw, so much so that the sections do not always fully comply with the expression; consequently some of the drawings may not correspond to the greatest height or designed diameter of the tooth illustrated.

The first tooth met with was, of course, the *central incisor*. The papilla of this tooth exhibited a bluntly ovoid shape, with a somewhat broader top, and slightly tapering to the lower end. As a matter of course, the whole papilla, at this stage, is destined for the

production of the crown of the tooth only, and there is no trace yet present of the future root.

The papilla is composed of a myxo-fibrous connective tissue throughout its main bulk, and is scantily supplied with capillary blood-vessels. The periphery of the papilla shows a row of odontoblasts, only at the labial aspect, and not entirely here, even, since the lowest third of the papilla lacks in this respect. Here, and on half of the summit, as well as along the whole lingual aspect, the surface of the papilla exhibits a myxomatous medullary tissue, without an admixture of delicate bundles of fibrous connective tissue, with which the rest of the papilla is abundantly supplied. The summit of the papilla is coated with a dentine and enamel-cap, the former being in its diameter slightly in excess of that of the latter. The dentine-cap is further advanced in development on the labial than on the lingual aspect; it exhibits a non-calcified portion nearest the papilla, which has assumed a deep stain from carmine; whereas the calcified portion remained unstained.

The border-line between the two is marked by the well-known globular deposit of lime-salts. The enamel-cap of a greenish brown color (due to the chromic acid), stops short of the dentine cap, and is, at its peripheral portion, made up of regularly developed prisms. The inner epithelium, from which arise the ameloblasts, produces a perfect row all around the papilla with the exception of the apex. The place of recurvation to the outer epithelium, which latter is considerably broken at this stage of development, is noticeably deeper on the labial than on the lingual aspect. The space between the inner epithelium and the already formed tooth is produced by a detachment of the former from the latter, and plainly shows a layer of protoplasmic bodies into which the ameloblasts have retrogressed before becoming infiltrated with lime-salts. Since this feature is pronounced in all the teeth of the jaws under consideration, the specimens are of great value in assisting at least in settling the still mooted question as to the mode of development of enamel. I propose to dwell more fully upon this topic after the description of the cuspid.

The central permanent incisor is a formation with a considerably broader papilla, but a less developed enamel and dentine-cap than the corresponding temporary tooth. The papilla is made up exclusively of medullary tissue supplied with scanty blood-vessels, none of which could be seen clearly in the specimen from which the illustration was taken. Both the inner and outer epithelium were plainly visible. The enamel-organ is much less advanced in the

formation of myxomatous tissue, especially at the point of recurvation of the epithelia, than in the temporary tooth.

The lateral temporary incisor has a papilla much longer than that of the central; at the same time it is of a more cylindrical form, otherwise of a structure identical in all respects. On the top of the papilla we notice a rounding labial, and a sharply pronounced angle at the lingual portion. We observe a row of odontoblasts only at the central portion of the labial surface, at the summit, and the upper two-thirds of the lingual aspect, while the rest of the surface is occupied by a medullary tissue destitute of fibrous elements, the same as in the central incisor. The dentine-cap is considerably broader than that of the central incisor, and extends farther down upon the labial surface. It of course forms a decided angle at the lingual portion of the top of the tooth. The border line between the non-calcified and calcified portions of the dentine is more conspicuous by the presence of globular deposits of lime-salts than in the central incisor. The enamel-cap is of about the breadth of that of the central, and strictly follows in its general contour, the dentine-cap. A pronounced feature in this tooth is the medullary tissue occupying the space between the row of ameloblasts and the surface of the tooth. The myxomatous enamel-organ in both temporary incisors does not show a well-developed reticulum, but in its stead a finely granular protoplasmic mass. Obviously a stage of development of the myxomatous reticulum is progressive formation.

The lateral permanent incisor has an oblong papilla, notable for the abrupt stopping of the enamel and dentine-caps, at the lingual aspect, and also for the precipitous lingual portion of its upper half. The blood-vessels are comparatively few in number, traversing the medullary tissue of the papilla. A fully-developed row of odontoblasts is to be seen only at the lingual and posterior cutting-edge; the rest of the cutting-edge is mostly destitute of these bodies. The rest of the papillary surface shows only rows of medullary corpuscles tending toward the formation of odontoblasts. A conspicuous feature in this specimen is the difference between the points of recurvation of the epithelia, which at the labial aspect embraces quite a portion of the bottom of the papilla; while at the lingual it barely reaches down one-half its length.

The temporary cuspid has a papilla which, it will be observed, is somewhat triangular in shape, with a sharply-pointed apex, and irregularly rounded at the base, with the lingual portion extending down slightly beyond the labia. The structure of the papilla does not materially differ from that of the incisors, the amount of capil-

laries also being about the same. A row of odontoblasts is observable only at the lower portions of the surface of the tooth, on the labial and lingual aspects. The summit is occupied by a well-pronounced myxomatous, the rest of the surface by a medullary tissue. The dentine-cap is very broad and sharply pointed at its summit. It extends far down along the surface of the papilla, more so anteriorly than posteriorly. The non-calcified position is decidedly narrower, and the globular boundary-line less pronounced than in the incisors. The enamel-cap is likewise very broad, stopping short of the dentine-cap, and is regularly developed in every respect.

The sections obtained from the cuspids were so perfect, that they could be utilized advantageously to assist in settling certain mooted questions, as to the development of dentine and enamel. In the first place, the odontoblasts have, since their discovery, been considered by the majority of histologists as the dentine-formers proper.

It was Heitzmann and Bödecker, in their above-quoted article, who first denied the direct transformation of odontoblasts into dentine, but claimed that they are first broken up into medullary corpuscles, at their distal ends, which become infiltrated, first, with a glue-yielding basis-substance, and afterward with lime-salts, and that the offshoots of the original odontoblasts, being the dentinal fibrillæ, ran between the calcified medullary corpuscles, in their respective canaliculi. Every odontoblast sends off one or more fibrillæ. This fact, with some observers, renders the formation of the basis-substance not clearly understood. So great indeed has been the difficulty, that E. Klein, of London, and R. R. Andrews, of Cambridge, have resorted to specific fiber-cells for the production of these fibrillæ, whilst the odontoblasts proper produce the basis-substance.

This view was met at the time by a demonstration, showing that the "fiber-cells" were wedge-shaped odontoblasts, and most numerous where the odontoblasts are arranged in a sharply curved line, especially at the summit of the papilla. In the pig's foetus, for instance, the summit of the papilla is occupied almost exclusively by such narrow and wedge-shaped odontoblasts. The difficulty is, however, easily overcome by the demonstration of medullary corpuscles at the periphery of the papilla, directly beneath the already formed dentine. In my specimens, especially the cuspid, one is struck by the scantiness of rows of odontoblasts and the presence of medullary elements in their stead; one row being visible on a portion of the labial, another on a portion of the lingual surfaces only. Not infrequently the odontoblasts are arranged at acute angles to

the dentinal canaliculi. This feature possibly may be attributed to the hardening process, and the subsequent disfigurement by shrinkage, although good reasons may be adduced to the contrary, as the specimens are so perfect in all other respects. The greater area of surface of the papilla is occupied by a medullary tissue, claimed to be the dentine-former proper. In our cuspid the summit is occupied by a myxomatous tissue, approaching in gracefulness almost that of the enamel-organ. Between this myxomatous tissue and the border of the non-calcified dentine, clusters of indifferent or medullary corpuscles are seen, arranged longitudinally along the surface of the papilla, therefore not as yet arranged for the formation of dentine. Beneath the myxomatous tissue we find vascularized myxo-fibrous tissue, constituting the main bulk of the papilla. Professor Ebner, of Vienna, in the "German Hand-book of Dentistry," 1891, by Scheff, Jr., claims that we have interrupted poorly-preserved specimens when we speak of medullary corpuscles as the dentine-formers. In view of this assertion, I will draw the gentleman's attention to those illustrations taken from perfect specimens, and ask him how he can account for the absence of odontoblasts, and in their stead, medullary tissues. Obviously, there is a series of tissue-changes preceding the appearance of dentine, and one of the links in the chain is the odontoblast. At the lateral portion of the cuspid, the question of the formation of enamel may possibly be settled.

Between the fully-developed enamel and the row of ameloblasts there is a broad layer of medullary tissue, considerably broader, indeed, than in any specimen of developing human teeth I have ever seen before. Ebner militates against the view "that the ameloblasts are not direct enamel-formers, but only transient formations, originating from a coalescence of medullary corpuscles, before the appearance of enamel-tissue." Can he or any one explain, may I ask, the composition of enamel-prisms of square or many-sided blocklets (admitted by all observers), except by the construction of each enamel-rod by a succession of medullary corpuscles, infiltrated with lime-salts?

It is unnecessary for me to state here that I seriously object to the assertion of Ebner, or anyone else, that our specimens were or are imperfect; the greatest care having been taken in their preparation, and I can vouch for their perfection. With equal propriety I might ask the learned professor why it is that his specimens were so perfect as to not show the fiber between the enamel-prisms, nor the medullary tissue between the ameloblasts proper and the formed enamel.

The permanent cuspid has a papilla considerably broader than

that of the temporary, so much so that it could be illustrated entirely only with a power of twenty-five diameters. The labial aspect is far more bulky than the lingual; the former being precipitous, the latter more tapering. It is composed of medullary, without the slightest admixture of myxo-fibrous or fibrous connective tissue, at the same time being poorly supplied with blood-vessels. Both the dentine and enamel-caps are as yet narrow, terminating upon the labial side abruptly, an apparent stricture presenting at their termination, beyond which the papilla bulges considerably; while on the lingual side, the dentine and enamel-caps follow the unbroken line of the papilla.

The first temporary molar, at this stage of development, is of considerable size and importance. It presents in this section two cusps, of which the lingual is quite noticeably higher than the buccal, although the latter is but little less developed than the former. The papilla is a bulky mass of myxo-fibrous connective tissue, abundantly supplied with capillary blood-vessels. Corresponding to the valley between the two cusps, the papilla is narrowest, bulging from this point upward and outward. The summit of the papilla of the lingual cusp is higher and more pointed than that of the buccal. The papilla exhibits a row of odontoblasts, and only at the lower third of the lingual tissue, without trace of odontoblasts. The summit of the papilla of the lingual cusp exhibits a zone of myxomatous tissue similar to that described in the papilla of the cuspid. The dentine-cap forms a continuous investment around the cusps, being narrow in the valley between them, and slanting toward the base of the papilla, reaching farther downward upon the buccal than upon the lingual side. It is fully developed, and composed of a narrow non-calcified and a broad calcified layer, the border line between the two portions being more globular in the buccal than in the lingual cusp. The enamel is likewise continuous, fully developed, and calcified, being a trifle broader at the summit of the lingual than at that of the buccal cusp. In the valley between the cusps it appears somewhat broader than the layer of dentine.

The first permanent bicuspid, the product of the bud from the first temporary molar, at birth corresponds to a temporary tooth four and a half months old. It is cone-shaped and composed of medullary tissue, with but scanty capillary blood-vessels at the base of the cone. As a matter of course, there is not even a trace of odontoblasts visible. The papilla is covered with a layer of columnar epithelia, the so-called inner epithelium of the enamel-organ, not as yet transformed into ameloblasts.

The point of recurvation of the inner into the outer epithelium is deeper down upon the buccal than upon the lingual aspect of the papilla. The outer epithelium is still recognizable as being composed of short columnar epithelia, surrounded by fibrous connective tissue. Between the inner and the outer epithelium there is a well-developed myxomatous reticulum, *the enamel-organ*. The intermediate layer is present, though as yet little pronounced. In the specimen from which the figure is taken, the upper portion of the enamel-organ is torn and partly missing.

The second temporary molar has in our specimen two well-developed cusps, of which the lingual far surpasses in size the buccal. This will, as a matter of course, not show the relation between the two cusps with certainty, since it is quite possible that with the lingual cusp was caught by the knife at its center, therefore, at its greatest height, while the buccal cusp may have been taken in a more peripheral portion, and thus appear smaller than it really is. Between the two cusps there is an elevation covered only by dentine, which likewise may represent a cusp cut near its periphery. The papilla is mainly myxo-fibrous connective tissue, and freely supplied with blood-vessels. Rows of odontoblasts are seen only at a small portion of its periphery. The height of the papilla is three times greater at the lingual than at the buccal portion. A striking feature is the sharp boundary line at the lingual aspect, between the papilla, covered with dentine, and that without it, and the bulging out of the latter. The dentine-cap is present all over the upper surface of the papilla, somewhat broader at the summit of the lingual cusp than on the summit of the buccal one. It is a trifle broader at the height of the central elevation than in the valleys either side of it.

The difference between the calcified and the non-calcified portions of the dentine is quite marked. There are two enamel-caps, formed one over each, the lingual and the buccal cusp; the former being almost twice the breadth of the latter.

The second permanent bicuspid is still younger in its development; it corresponds to a temporary tooth in the fourth month of embryonal life. The papilla is a blunt cone divided into a conical upper portion, surrounded by the inner epithelium, and a broad base surrounded by fibrous connective tissue. The papilla is made up altogether of medullary tissue, and shows blood-vessels at its base in small numbers. The inner epithelium is quite conspicuous by the column of its constituent elements. The same elements also produce the row of outer epithelia, which appear shortened only at the summit of the enamel-organ. The enamel-organ itself is not as yet

fully developed, its points of intersection being large, the meshes, on the contrary, narrow. The intermediate layer is but little pronounced. In this specimen the enamel-organ was unbroken.

The first permanent molar is an unusually well-developed tooth in our series. It has two well-pronounced cusps, the largest being the lingual. The papilla is composed mainly of myxomatous and medullary tissue, with an admixture of some delicate fibrous connective tissue. Its vascular supply is as yet scanty. It shows deep incisions on both the lingual and the buccal aspects, corresponding to the dentine-caps, beneath which the papilla bulges quite noticeably. Rows of odontoblasts are seen along the greater extent of the papilla; especially is this the case upon the lingual aspect, which shows an uninterrupted row of these formations. A second row is seen in the valley between the two cusps, where there is as yet no dentine formed. There are separate dentine-caps for each cusp, that over the lingual cusps being especially well developed.

The enamel-caps are, as is the rule in all developing teeth, shorter than the dentine-caps; that of the lingual cusp being at its summit twice as thick as that upon the buccal. The row of inner epithelia is transferred into ameloblasts over both cusps, and there is a distinct layer of medullary tissue present between the ameloblasts and the fully-developed enamel. The outer epithelium begins to break up at its upper portion, where the enamel-organ forms a broad layer of myxomatous tissue.

Huxley (*Quarterly Journal of Microscopical Science*, 1853), as early as 1853, says, when speaking of the development of dentine, "that it is not explicable by the cell theory." How true this statement, made so many years ago. We do not, however, agree with his assertion, that the pulp-tissue takes no part in the formation of dentine. Any one considering the so-called cells as stable and unchangeable formations, will be at a loss to explain the formation of any tissue of the teeth. The latest researches in histology have proven that as far as the morphological elements are concerned, there is nothing stable during the advancing formation of the organism and its constituent parts; nor during full development, at the height of life; and far less is this the case during its decline. Before a tissue is fully formed, there are repeated oscillations forward and backward, in the appearance of morphological elements; the intervening stage being their reduction into the stage of indifferent medullary or embryonal tissue. It has been proven that the papilla of the developing teeth may proceed to the formation of myxomatous, nay myxo-fibrous connective tissue. At its periphery this tissue, sprung from medullary corpuscles, falls back to medullary corpuscles, which

unite into large branching protoplasmic bodies, resembling columnar epithelia; the so-called odontoblasts. These are by no means the dentine-formers proper, no more so than that osteoblasts are the real bone-formers. Both these formations are nothing but a pre-stage toward the formation of either dentinal or bone-tissue. Odontoblasts break up once more into medullary corpuscles, from which at last, by their infiltration with basis-substance, and immediate deposition of lime-salt, are first non-calcified, and at last calcified dentine produced. The zigzag line of development of dentine, therefore, is first embryonal or medullary tissue; second, myxomatous or myxo-fibrous tissue; third, embryonal or medullary tissue; fourth, odontoblasts; fifth, again embryonal or medullary tissue; and sixth and lastly, non-calcified and calcified dentine.

Every reduction to embryonal tissue is followed by a step in advance in the development of the organ, until at last the most perfect tissue, such as dentine, will make its appearance. It is a question in my mind, whether the dentine as we see it at the time of birth is a lasting formation, or the same as we see it in the fully-grown temporary or permanent tooth. The size of the papilla and the dentine-cap are at birth far too small in comparison with what we see at the time of eruption. It is quite possible, therefore, that the first-formed dentine-cap is not lasting, and may eventually be reduced once more into medullary tissue, before the permanent breadth of dentine corresponding to the transverse diameter of a fully-formed tooth is reached. Similar oscillation must, of necessity, take place in the production of the pulp and the dentine of the roots. At the time of birth, only the papilla of the crown is present, sharply bordering downward by fibrous connective tissue. This latter tissue is reduced to its embryonal condition in order to produce the necessary material for the production of the dentine of roots. Future observations will be required in order to settle the question as to how the dentine and cementum of the roots are formed.

The same puzzle we meet with, in the history of development of the enamel. At the time of birth, the myxomatous enamel-organ is far too small to enable us to understand the formation of a broad enamel-layer, such as we see at the time of eruption. Even the first established enamel-caps are far too small in comparison with the diameter of the crowns of either temporary or permanent teeth. Heitzmann and Bödecker, in their above-quoted publication, the result of eight years' hard labor, came to the conclusion that the elements of the original epithelial pegs are reduced to medullary tissue, afterward to fibrous connective tissue, next to medullary tissue, and eventually to ameloblasts. Ameloblasts, according to their

notion, are not direct enamel-formers, no more that odontoblasts are direct dentine-formers. The ameloblasts are reduced to medullary corpuscles, which after infiltration with the basis-substance, and immediate deposition of lime-salts, at last produce enamel-prisms.

From a study of their specimens and my own, I am convinced that these views are correct.

Should the first appearing enamel-cap prove too small for a full-grown tooth, nothing is left to solve the puzzle of development but the assumption that even the foetal enamel-cap is not lasting, and must undergo reduction or possibly repeated reduction to medullary tissue, before it reaches the extent of a fully-developed tooth, such as we see at the time of eruption.

DISCUSSION.

DR. R. R. ANDREWS, Cambridge, Mass. A tooth calcifies, I understand it, by the salts of lime in the first form of minute globules of various sizes being given out from the cell in clusters, which coalesce and form larger masses through a substance not calcified, marked between the two dark lines on the drawing shown you. They adhere to the tissue already largely calcified, form a layer, and by a chemical process are fully calcified and form another layer. They are masses of calco-globulin, not cells in any sense of the word. This tissue, which is marked full of minute spots, as I may call them, has no spots under the microscope. It looks like a mass of what we call lime-salts. It is perfectly clear, and has none of these little granules which the pen has given on the drawing. What the paper calls medullary corpuscles are simply calco-spherites, passing through the cells, coalescing and forming larger masses which shall finally blend into a whole layer, which by a process of further calcification shall make the same tissue as we see here.

DR. SUDDUTH. This subject has been gone over for years, and I do not think we will ever be able to come to an understanding of the true interpretation of the phenomena. I do not see that we are any nearer than we were in 1885, when we first began to discuss this subject. The doctor has taken up a line of work that has not heretofore received thorough consideration,—that is, a serial line of study of the human teeth at birth, commencing at the central incisor. I cannot agree with Dr. Abbott in his method of presenting the subject. Give a man his own premise, and he surely ought to be able to prove his position. To discuss Dr. Abbott's paper from the drawings he presents, is equal to giving him his premise. I never have been able to put any interpretation upon the bodies referred to by Dr. Abbott as medullary tissue, lying between the

ameloblast and the fully-formed enamel. Dr. Andrews has presented that in the correct way.

I have a serial line of preparations here, taking this subject from the very beginning, through to the fully calcified tooth, at about the fifth year. Some of them are slides and some are permanent preparations, where the cell-tissues have been taken out and the teeth kept *in situ*, and I think I can demonstrate that there is a progressive development until the permanent teeth are developed. I have never seen any indication that the enamel-cap recedes and is lost. The point that it is too small to represent the crown of the permanent tooth is not well taken, because it represents simply the apex of the tooth, and the expansion is lateral and the development downward, and you can get just as much thickness as there is space to develop in. The temporary tooth illustrates the point better. The tubules run down vertically over the surface of the papillæ. The columns stand at right angles to the surface of the papillæ. These would come down so as to bring increased thickness at the apex of the tooth. In the development of secondary dentine, you can fill in the apex of the pulp and get an increased thickness of dentine over the surface.

DR. THOMPSON. I desire to congratulate the writer of the paper, but in microscopical work the technics are at fault, producing appearances which are interpreted differently by various students and writers. A great deal of interpretation ought therefore to be made as provisional, until such time as the observer is enabled to see it more as it should appear. Very often the tissues are disturbed, and destroyed almost by the processes which are used in microscopical investigation, so that many appearances are produced by faulty manipulation and faulty diagnosis.

DR. ANDREWS. That point is a very good one. Much of the tissue is so shrunken that you do not get the original form. Investigations should commence while the tissue is still warm, before it gets a chance to dry.

DR. ABBOTT. While everyone tries to get as near Nature as possible, it is a fact that men do not agree as to the formation of tissue. Hardly two think alike on that point. If they did, there would be no progress, and all investigation would end. Dr. Sudduth and Dr. Andrews think differently from myself, and we are constantly sparring in a friendly way. We try to be as careful as possible in what we do, and the public gets the benefit of our study and our investigation. As to the change in tissue under the microscope, I think you can never tell how much it has changed. We preserve the tissue as nearly perfect as we can. A first temporary molar tooth of the

lower jaw under the microscope, is considerably over a quarter of an inch, the way it is cut, or it should be, to develop into a tooth the size it should be when in the mouth ; but it is not that size, being considerably smaller. Here is a bicuspid where there is no development at all, except that the enamel-organ goes under the papillæ at the other side, where there is no development of dentine. We do not get a perfect cut through it. This tooth is narrower than we would suppose. We might account for the narrow condition in the front teeth by the fact that the teeth were turned around, but in the back teeth we cannot account for it.

DR. SUDDUTH. The pulp-tissue, being highly vascular and resembling embryonic tissue, and in fact being embryonic tissue, and not mature tissue, shrinks a great deal more than mature tissue would. I have taken fresh jaws, and in making an incision on each side of the jaw and leaving out the papillæ on the mucous membrane, I find that they are very much broader at the base than when the tissue had been hardened. That would account for the lack in width.

[Dr. Sudduth then announced that the regular program for the evening would be the presentation of Dr. Andrews's paper on the development of enamel, virtually a continuation of this subject, and his own paper on the forces which tend to modify the form of teeth and jaw. To-morrow evening there will be two or three lantern exhibits, which will close the work of this Section. Dr. Thompson also has a paper for to-morrow afternoon.]

Adjourned until Thursday afternoon at 2.30 o'clock.

SECTION II.—ETIOLOGY, PATHOLOGY, AND BACTERIOLOGY.

In the absence of the chairman, G. V. Black, M.D., D.D.S., Dr. J. D. Patterson took the chair, and appointed Dr. Davis as secretary, Dr. Chisholm being absent. No discussion was had on the subject of the general session referred to this Section.

Dr. L. C. Ingersoll read his paper, of which an abstract follows:

THE RELATION OF PREDISPOSING CAUSES (SO-CALLED) TO THE ACTIVE CAUSES OF DENTAL DECAY.

Dental pathology presents one aspect that at once arrests the attention of mankind, and which is made the basis upon which the dental profession is built, viz: The fact of dental decay, without which the dental profession would never have come into existence.

The subject of the etiology of dental decay is commonly presented under two heads—*exciting* and *predisposing* causes. The

use of the term predisposing causes, is open to criticism. The relation of causation to results is that of effective means acting to produce the results. Mere passivity cannot be a *cause*, for a cause implies activity. Mere presence and passivity may be conditions affecting the operation of active causes, and such is the view that should be taken of what are commonly known as *predisposing causes* of dental decay.

In approaching the subject of pre-existing conditions affecting dental decay, the greatness of the task of presenting a comprehensive view is at once evident and forestalling. I shall not, therefore, attempt it; for it would embrace a complete history of an individual, reaching back over many ancestral lines, inquiring into inherited idiosyncrasies, and the effect of every extraneous influence that could in any way enter as a factor into tissue and organic development.

Sufficient for my present purpose to know that every tissue of the body, whatever its general law of physiological development, has come to be what it is through various modifications of its typical nature, and has received an impress peculiarly its own, derived from a great variety of sources. Into the midst of these modifications of typical forms and the peculiarities of structure and function we are to learn, if possible, to what extent pre-existing conditions are responsible for the exciting or active causes of decay.

It was a great step forward in accounting for dental decay when what had long been a mere presumption became a demonstrated fact, that micro-organisms are a potent factor in breaking down the hard tooth-structures. Many became ready to renounce all other theories and demonstrations touching the subject, and the existence and working of micro-organisms in the teeth became the most interesting of all subjects presented before dental societies. The influence of the teaching was so widespread and so deeply impressed that few thought of anything else in relation to etiology, whether pertaining to the hard or to the soft tissues, than the potent influence of bacteria.

It is not strange, therefore, with all the excited interest that has been aroused concerning the history, habits, and work of bacteria, and the numerous demonstrations that have been given of their destructive work upon human teeth, that the profession should overestimate the work of micro-organisms; forgetting for the time being the conditions that restrain the active working of bacteria.

There seems to be an abiding impression in the minds of some that if bacteria are found in the mouth they must exercise a destructive agency upon the teeth, and that prophylactic antisepsis is absolutely essential to prevent decay.

The chemical theory of the decomposition of the mineral portions of teeth must be accepted from first to last of the process of decay, the only change apparent being in the source of acid supply; in the one case it is derived from decomposition of organic matter resting upon the surface of the teeth, and in the other case the acid is elaborated by bacteria. But why should it be thought necessary to abandon a theory of decay by vegetable and mineral acids chemically produced, when accepting the theory of decay by acids produced by organic germs? It is chemical decomposition in either case, with the additional destructive work of the bacteria gaining their food-supply by devouring a portion of the organic matters composing, in part, the substance of the teeth.

Let us next inquire into the relation of so-called predisposing causes to the exciting and active causes of dental decay. Is the relation such that when the active causes are present in the mouth, decay of the teeth is inevitable? From what we know of oxygen, we know that when it comes in uninterrupted contact with base metals, it corrodes them. From what we now know of the agencies that destroy human teeth, is it certain that their presence is a sure prophecy of tooth-destruction? Are there any pre-existing conditions and tendencies that restrain active causes? Are these favoring or restraining influences inherent in the nature of tooth-structure, or are they accidental and artificial?

We know that while metals, for the most part, are oxidizable, such metals as platinum, gold, and aluminum are practically free from oxidation. The reason for this difference in the oxidizable tendencies of metals must be found in the nature of the metals themselves, a restraining and antagonizing element inherent in their composition. Disease is from without; antagonism to disease is from within, and the strength of the antagonism depends upon the nature and functions of the tissue or organ. The fact that organic substances do not exhibit the same antagonizing resistance in the presence of destructive influence from without is evidence of a difference of elementary constituents. While the greatest of the difference is created by vitality, which resists chemical decomposition, there is, wholly independent of life, a great difference in the material structure which invites decay. Because of this difference of material composition, one substance decays, while in the same condition and subject to the same influence another does not decay.

Such facts lead us to conclude that the etiology of dental decay is not to be found alone in external influences, but also in the inherent nature of tooth-substance.

The impressibility of protoplasm is illustrated in the formation

of cicatricial tissue in which a new form of tissue results from violence received by the Malpighian layer of cells, causing them to deviate from their normal production of tissue and to form a new kind of tissue, and to continue that deviation through the life of the individual.

These examples are illustrations of the potentiality of germ life, and of the certain and permanent character of protoplasmic impressions. I have known a case where, in the mouths of three generations, the same tooth, correspondingly, decayed after adult life, while the contiguous teeth remained firm. I have also known excrescences to appear at the advanced period of life which in location and form were exact reproductions of what appeared on the person of the father when at the same age — showing that in case of the son it was not produced by irritation, organic germs, or other external influence, but by inherited impress.

It is sometimes said that if teeth are only kept clean they will not decay. Yet, in the very face of this teaching, we find teeth that are kept clean to the extremest limit of practicability, decay early and rapidly; and on the other hand we find teeth that are never cleaned from month to month, retain their firmness of substance to a good old age, in spite of the microbe.

The history of the microbe is the same as that of animal life everywhere. Food supply is essential to life support. His location is one of chance, not of choice. If he chance to enter a mouth where decomposition is already prevalent, liquefying organic substances for his food, he can set up housekeeping immediately and propagate an immense family. But if no such condition exists, the law of self-preservation compels the microbe to elaborate an acid and enter upon the work of dissolving whatever hard substance he has access to, which contains the nutrient that he needs. If such exists in the teeth, the tooth-substance is dissolved. Plant life exhibits the same great fact. If a proper supply can be obtained, the plant lives; if not, it dies. The microbe succumbs to the same fate under similar circumstances. No doubt millions of organic germs, not finding a congenial field for their support, die of starvation. Multitudes of others die, because, having reached the end of a limited existence, like the millions of ephemera that infest the air, covering the face of nature like a veil, they live one day and die.

As animals of a larger species prey upon each other, the stronger overcoming the weaker, and as plants of one species take possession of a field, and by vigorous growing monopolize the virtues of the soil, or by the peculiar nature of their waste products drive from the

ground all other plants, so we may expect to find that one species of microbe will prove to be a lion and devour other microbes, or a baneful germ that will not allow other germs to prosper within reach of its baneful influence. The habits of life, whether exhibited by plants, animals, or men, have many such striking analogies.

When the favoring and restraining conditions of dental decay are compared, it will be found that the latter far outnumber the former, and are far more potent in their influence.

Were it not for the checks, restraints, and compensating balances that nature holds over the retrograde processes by which organic nature returns to the elements, the decompositions which are inevitable would depopulate the world in a single summer; and were it not for the restraints and antagonism set up in the mouths of the human family, every tooth would melt down under the influence of decay within a year, and not one be seen in human jaws; and that, too, in spite of every practicable system of antisepticism that could be adopted.

On the contrary, we find individuals in whose mouths the conditions favoring decay—the so-called predisposing causes—are so over-matched by resisting and restraining conditions, that decay of the teeth is prevented. This is the true *vis medicatrix nature*,—something that nature instils into structures to render them enduring and serviceable while life shall last. This is in harmony with the philosophy of life, and the demand of physiological functions. This is nature's self-defense against destruction, a sure cure for dental decay. Antisepticism is not a cure; prophylaxis is.

Here there meets us the grandest theme ever presented in dental literature, the prevention of dental decay. Not that prevention which arrests decay when its work of destruction is half done; but that prevention which does not allow the work of decay to begin; that prevention which establishes by hygienic law a barrier in the very nature of tooth-substance that will effectually resist all external influences; that prevention which reaches back to embryonic life, and touches the protoplasmic germ and stamps it with longevity. We need less of cotton-wood and poplar, more of oak and cedar in teeth, more of the resistance of platinum and gold in their nature. We need a better understanding of that dental hygiene that guards the very portals of life and nutrition, and forbids the entrance into the tissues of the teeth of every element of weakness and decay. Then we may expect that teeth will bear on their faces the monumental records of a comfortable and happy old age.

DISCUSSION.

DR. H. W. MOORE, Santa Barbara, Cal. We know that pathogenic germs, as of typhoid fever and tuberculosis, exist in the dust blown about the streets from expectoration and other sources. The same matter is taken into the cistern from the roof and in time is pumped up and we drink it, and if the system is predisposed to infection from those germs, we are affected by it unquestionably. The paper has a good bearing on the point that it is probably defects in the tooth-structure that allow the admission of pathogenic and acid-producing germs to make their first inroads into the teeth. Healthy tissue is a germicide, and the only hope we have is to improve the physical condition of man. In that we have a great field before us. The germs we need to be afraid of in the decay of the teeth are putrefactive and fermentative. We need not fear the germs producing tuberculosis and typhoid unless they have a two-fold property,—that of destroying the tooth-structure also.

DR. J. W. MORRISON, Nashville, Tenn. In regard to the germ theory in the production of caries, I am certainly an advocate. Dr. Miller has done great service in investigating this matter, as much so in this direction as Cope or Pasteur have in their lines. As to the illustrations brought on one side, they can be met with equal ability on the other. One idea that may be conveyed by the paper I don't like. It has a tendency to convey the idea that cleanliness is not necessary; that antiseptic precautions are not necessary. He compares a tooth with iron and wood in its affectibility. He illustrates by using the cedar, oak, and cotton-wood; but cedar resists atmospheric and chemical changes because it contains an oil, and that very oil has been applied to medical purposes as a preservative. As to iron he has referred to, there are some here who remember a few years ago when railroad men were very much exercised over the inroads of certain germs that threatened to destroy all the iron. In certain localities it actually destroyed the iron. There are times when the atmosphere seems to be favorable to the propagation of these lower forms of animal life and when the system seems to be in a condition to propagate them. So in the teeth there are those that are in a condition for the successful propagation of these forms of animal life.

As to cleanliness and the necessity for it. We all know that in the manufacture of vinegar, especially from fruit juices, if the juice is put into a clean barrel, in many cases it will not sour nor be converted into acetic acid, but there is a germ sometimes that takes possession of this vinegar; as another illustration that one germ will

destroy another, and that is the germ of putretaction which causes the juice to rot and not be converted to vinegar.

DR. E. S. CHISHOLM, Tuscaloosa, Ala. The writer has touched upon a most vital point. Recent studies in bacteriology have not been carried on in the line which the original investigators had laid down. We have recently discovered bugs in everything, and if the conditions of things are such as we are now taught, we would have been permeated with disease and the whole world have been dead long ago. The speaker did not wish to be understood as saying that bacteria did not play an important part in many things, but we have gone to extremes. I am willing to go on record as saying that acid plays a far greater part in the causation of decay than bacteria, and that the location of decay in the smaller cavities of the teeth is only the indigenous home of bacteria.

DR. MOORE thought Dr. Miller had proven beyond a doubt that acid is one of the products of bacteria.

DR. L. L. DAVIS, Chicago, understood so well Dr. Ingersoll's position in regard to bacteriology that he did not for a moment intend to detract from it. He is simply calling attention to the fact that possibly some of us have been led a little astray in the study of bugs, and that we should look to the fact that there are within our systems certain formations, call it what you will. He lays on one side common iron and on the other Russia iron. That is simply a matter of development or scientific process of preparation. Iron is the same in its component parts. As one gentleman has already said, we should look for the highest development of the species rather than go into the theory so far that we forget even the prominent points that must be ever kept in mind.

A paper on Oral Pathology, by Dr. R. Finley Hunt, Washington, D. C., was read by the secretary of the Section.

ORAL PATHOLOGY.

In this paper it is the intention to treat of but one of the many pathological conditions to which the oral organs are subject. It is that pathological condition of the oral mucous membrane and subjacent tissues commonly known as the "rubber-disease," or "rubber sore-mouth."

It is true that quite a number of dentists deny the existence of this disease as being produced by the wearing of rubber plates, *per se*, yet the concordant testimony of members of the profession of the last and the present generation seem to establish beyond controversy not only its existence, but its existence as a specific disease

produced by a specific cause,—viz., the wearing of rubber plates in direct contact with the mucous membrane.

This testimony can be obtained from the records of dental societies and associations, and from dental journals commencing about the year 1866—*i.e.*, soon after dental rubber plates came into use.

Surely the evidence does identify the pathological condition now under examination as a specific disease with distinct symptoms and characteristics, and does establish beyond controversy the fact that it is caused by wearing vulcanized rubber in direct, constant, and adhesive contact with the mucous membrane in the mouth.

From the same evidence may be deduced its symptoms, stages, and effects, as follows: A low order of vitality in the parts covered by the plates; a peculiar pallor of the same; irritation, swelling, redness, inflammation; congested, engorged, hyperemic condition; granulation,—granulated masses like a strawberry, red, purple, scarlet, soft and spongy; half the arch filled with a spongy mass; blood oozing from the diseased parts; turgidity of the vessels; roof of the mouth like half-decayed raw beef cut across the grain; suppurating, discharging condition, ulceration; pus exuding from the folds; sanguino-purulent fluid constantly exuding from the apertures in the palate over the necrosed bone; sensitiveness so obtunded that no pain is felt, or in other cases, a burning, drawing, feverish sensation; lines of inflammation extending to the throat, causing disagreeable tickling sensation, and annoying cough; bronchial affections, chronic catarrh; sloughing of the soft parts; in some cases death.

It is left for you to decide what must be the disastrous effects of such conditions of the tissues of the mouth, “that gateway of life” upon the other organs of the body, and upon the general health.

Should we not feel that a paramount duty rests upon each and every member of our profession, with a weight that should be irresistible, to devote all our energies to the work of relieving our patients from this loathsome and often fatal disease? There can be no answer to this but an affirmative one.

Is it within our power to do this? The evidence referred to in this paper shows that when the lesions have not progressed too far, a cure has always been effected and a recurrence of the disease prevented in three ways: viz., by discarding altogether the rubber plate; by substituting for it a plate of gold, platinum, or even silver; and by interposing permanently between the rubber and mucous membrane a foil or thin sheet of metal. When the last method has been applied, using ordinary metallic foil, the effect has not been permanent, because the mouth surface of the foil in con-

tact with the rubber allows it in a short time to separate from the rubber, and scales off, leaving the rubber exposed, and to that extent in direct contact with the membrane. The foil or thin plate should be so prepared that while its surface presented to the membrane is smooth, its other surface in contact with the rubber is so roughened as to make the union of the two permanent. The range of metals that have been found successful in relieving and curing this disease is wide,—as gold, platinum, silver, tin, and aluminum. The requisites most effective in the foil used are, as shown by experience,—purity, cohesiveness, and a permanent union with the rubber. Gold, as at present prepared, best meets these requirements.

This disease possesses one characteristic, common to many others, and that is the difference in the degree of virulence with which it attacks different patients. With some it progresses to a fatal termination, while with others it seems to reach certain stages and there stop. These stages may be anywhere between total immunity and the final and fatal one, which is probably due to the diathesis or systemic condition of the individual wearer of unlined rubber plate. If so, there may be such fluctuations in the systemic condition as to induce a more virulent stage of the disease. It would therefore seem to be our duty to insist that every rubber plate (and people will wear rubber plates) when made should be equipped with the best lining obtainable, thus adopting in this matter that best of all systems, prophylaxis, and especially as we know that a pure metallic surface in contact with the mucous membrane will ward off the rubber disease.

Simply as a matter of taste and cleanliness a gold-lined rubber plate is purer, brighter, sweeter, and more cleanly than an unlined one.

It is hoped that this much neglected subject will receive the attention and study which its gravity demands.

DISCUSSION.

DR. H. B. NOBLE, Washington, D. C. We have been observing for years all these conditions noticed under the rubber plate, but if the profession feels as I do, they would wish there was no such thing as rubber plate. But I fear it will be a long time before rubber plates will not be worn; then let us put them in the best possible way.

I think that the Daly gold-lining should be placed on all rubber plates in the mouth. It is certainly one that will stand; and we in Washington, the home of the Daly gold-lining, felt that the attention of the profession ought to be called to the fact that there was

a substance that would be put on a rubber plate that would make it far better than without. I am happy to see that we are fast passing back into the stage when only metallic substances were used in the mouth.

DR. C. L. BOYD, Alabama. I have noticed that the trouble referred to is almost always found in the upper ends of the lower jaw, and for that reason I am led to believe that it is not so much from the rubber as it is from the hanging of the plate and mis-adaptation. I am glad to know we have a substance with which to line rubber, but do not think rubber should be condemned entirely. In many cases I have replaced rubber plates, using not red, but brown rubber. In many cases I found the strawberry appearance to be caused by a bad-fitting plate. If the plate fits the mouth perfectly and the patient wears it six or eight weeks, treating the mouth with an antiseptic and afterward make the patient a second plate, you will find if the second plate is a perfect adaptation, if the teeth come together properly and there is no rocking, that the inflammation will in most cases subside. That disruption of the process and antral abscess are produced by rubber plates I am slow to believe, because we find this trouble in many cases where the teeth are in the mouth and the patient has never worn a plate. The worst case I had ever seen was in a mouth which had never worn a plate.

DR. N. NELSON, Chicago, said that having had experience in making plates before he knew anything of rubber, he had some certain knowledge in the matter.

I don't take sides with either of the gentlemen who have spoken. The rubber itself does not affect the mouth in any degree to speak of, but it is the ingredients in the rubber, red rubber especially. In the cases where the tissues have been strawberry red and the mucous membrane has been destroyed or been pussy and cushion-like all over the mouth, I have relieved the mouth by not wearing the plate for two or three weeks or a month and making a black rubber plate. There is no doubt that the riding and rocking in the mouth has a greater tendency to disruption of the alveolar process than anything else. The gold lining I have tried, but have not found it satisfactory, owing to the gold being too thin.

DR. NELSON thought it a mistake to put a plate in before the tissue and gum had grown in. In no case does a patient get a plate from him in less than three or four months.

DR. W. E. WALKER, of Bay St. Louis, Miss., at this point asked Dr. Boyd if he noticed the conditions spoken of as frequently with black rubber as he did with red rubber.

DR. BOYD answered that there were but few black plates used in

his section of the country. I use the whalebone rubber, which is a brown rubber. My opinion is that dark rubber will not produce trouble if the occlusion as well as the adaptation to the mucous membrane is perfect. With black rubber I think there will be no inflammation.

DR. G. W. COOK said that in regard to dark rubbers, he thought the worst case he ever saw was in connection with a black rubber plate made by a gentleman in the city, who had tried three red plates and had had very poor satisfaction, and concluded he would make it work with black rubber. A few months after the insertion of the black rubber plate, he came to the conclusion that the patient could not wear rubber at all. He has used dark rubber almost exclusively, and was very sorry to say that he had had many cases of rubber-poisoning from the dark rubber.

DR. MOORE asked if the doctor had an air vacuum in his plates?

DR. COOK. No, sir.

DR. MOORE. Have you ever had trouble in the lower jaw?

DR. COOK. Yes, a very severe case, where a gentleman had lost the two centrals and one lateral and some of the back teeth. His mouth got quite sore from the use of the plate, and it was not exactly where it impinged upon the next tooth either. Shortly after that he went East, and the rest of his teeth were taken out and a rubber plate inserted. When he came back, his mouth was quite sore. I took him to an eminent person in this city, who pronounced it a case of rubber-poisoning, and it was black rubber that did it.

DR. H. C. MILLER, Portland, Ore., said that in his opinion it was the material contained in the rubber that caused most of the trouble. In most all the cases I have seen, the plates were made of red or brown rubber, and in the worst cases the symptoms were of mercurial poisoning, more or less. Under no circumstance did he use a red rubber plate, but used black rubber, covering the surface with tin foil. We must admit, he said, that a plate which is a non-conductor, covering the surface of the mouth, is not equal to a metallic plate, which is a good conductor of heat. He had replaced a great many rubber plates with celluloid, which was almost equal to gold in its results. He thought that dentists were justified in making rubber plates without a metallic lining. It is only a question of time that the lining is worn through, and persons who are subject to mercurial poisoning will be more or less affected by it. A great deal of the trouble is due to poor fits. Mouths are made very sore with black rubber and also gold plates, which is to be attributed in most cases to poor fits.

The speaker thought that the use of air-chambers should be abandoned; while it might be of advantage in assisting the patient to hold the plate in position at first, by being careful and with a little persuasion he thought it could be dispensed with.

DR. S. J. MACMILLAN, Somerset, Pa., said: The point made that the soreness is caused by poor-fitting plates, is well taken. When we find soreness we must look for the cause in some place other than that a rubber plate has been worn, although the rubber, being a non-conductor, is probably a fruitful cause of this trouble, and the metallic plate is better suited to these mucous surfaces.

DR. COOK had a patient once who was unable to wear a metallic plate, and for whom he had to make a rubber plate finally. He had a gold plate put in in New York, but was unable to wear it. I made a rubber set for him which gave no trouble. What it was that caused the trouble I do not know, and I do not know that the other gentleman did. Has any one here had such an experience?

DR. H. C. MILLER, Portland, Ore. I believe we overlook the fact that the tissues of the mouth covered by the plate are liable to the same trouble as other portions of the body. We may have cancer on the gums or other parts of the mouth caused by other means than by plates. A gentleman came to me only a few weeks ago who had not worn a plate for years, and within the last year had had a sore mouth a great deal of the time. There appeared to be cankerous patches in a great many places. The trouble is not always caused by the plate.

DR. H. E. WALKER said that he had seen a few cases of rubber-disease, and that it should not be confounded with mucous patches that come when the plate extends too far. What is known as rubber-disease is throughout the surface of the plate with a distinct outline where the plate stops. He was inclined to think that due to the rubber being a non-conductor rather than because it contains mercury.

DR. G. B. HUFF, Somerset, Pa., thought that troubles often called rubber-disease are not rubber-disease. It may be caused by misfitting plates or deep air-chambers. He thought that the non-conducting property of rubber was the principal cause of the trouble. He had noticed what is called rubber-disease under gold and other kinds of plates.

DR. I. P. WILSON, Burlington, Ia., said that if the plate was left out of the mouth at night the trouble would be greatly avoided. Dentists generally advised their patients to keep the plate in all the time. If any part of the body were covered all the time, an abnormal condition would probably be produced. If the plate is taken

out at night and cleaned thoroughly, the mouth will remain in a healthy condition in forty-nine cases out of fifty. The spongy condition of the mouth is noticed most frequently in the front part, and usually occurs where the molar teeth of the lower jaw are out, which throws the pressure on the front teeth.

DR. E. S. CHISHOLM, Tuscaloosa, Ala., did not think rubber should be banished from artificial dentures altogether. In most cases where patients have sores in the mouth, they may not clean them once in a week or a month. I had an experience where a gold plate had been worn and produced that redness and tumefied condition, and by substituting a rubber plate the patient was entirely relieved. In my case I never leave any rough surface. I scrape very delicately the surface of rubber plates with a small sharp instrument, and I do not have a troublesome case in five hundred.

DR. BOYD. In regard to cleanliness, while gold plates are easier kept clean they sometimes come to us very dirty. While cleanliness does enter into the cause of the trouble, if we make a plate perfectly adapted, with no air-chamber and the surface of the plate perfectly smooth, in the absence of some peculiar idiosyncrasy and susceptibility to the mercury in the rubber, none of the disease spoken of will occur.

DR. J. D. PATTERSON, Kansas City, the temporary chairman, closed the discussion, saying: It has been a surprise to hear so much on what is called rubber-disease. I think there is no such thing at all. It has been proved that the mercury in rubber is entirely inert. The first and prime cause is uncleanness of the plate. A rubber plate perfectly polished inside and outside will be as good as a gold plate, except that the gold plate is a good conductor of heat; but if the rubber plate is taken out at night the irritation will be done away with to a large extent. I have had experience with gold, aluminum, and all kinds of rubbers, and I do not believe there is any poisonous quality in the rubber that affects the mouth. The little ducts are destroyed by keeping the plate in the mouth continuously; more, perhaps, in rubber because it is more confining. Rubber-disease has been unknown to me for fifteen or twenty years. It has been demonstrated that no deleterious effects can be produced by the presence of mercury in rubber.

Adjourned till Thursday afternoon.

SECTION III.—CHEMISTRY AND METALLURGY.

This Section held no meeting.

SECTION IV.—THERAPEUTICS AND MATERIA MEDICA.

Meeting called to order at 2.30 P.M. Dr. F. J. S. Gorgas in the chair.

The discussion of the subject of local anesthesia by the use of cocain was continued, as follows :

DR. HEWITT, of Chicago. The dentist that will day after day place his bur upon sensitive dentine, the pain following which is severer than that of the surgeon's knife in laparotomy, and continue to do so day after day, when within his grasp lies that which will obtund the pain and free the patient from fear, is brutish. I advocate the use of cocain daily in every dental office. Every time that you pass a gilling twine around tooth to carry the rubber-dam up high enough to pass the cavities, you inflict pain. You have no right to do that. Whenever you put a rubber-dam clamp on the tooth without first obtunding the sensitive dentine, you are negligent of the first duty of the dentist to his patrons.

There are ways in which painlessness may be acquired in burring sensitive dentine, in cutting down on to the live pulp, in amputating the crown of the live tooth, in amputating exostosis of the jaw, in amputating a tumor that may be situated upon the tongue, in performing any operation upon the mouth with the patient perfectly conscious, able to open his mouth upon request, to spit out the blood when it is required and absolutely without pain.

I hold in my hands a little vial that contains what I have named, "Compound Cocain Pigment." I never allow myself to apply the gilling twine to the teeth of my patients before applying this. I have made what some of you may call a shot-gun prescription, that is to say, there are eight ingredients, and they are as follows :

Atropin, one-tenth of a grain.

I use this for the same reason that Dr. Pruyn told you the other day that they gave morphin as an antecedent, to guard against the toxic effects of the cocain.

Stropanthin, one-fifth of a grain.

That is the best known heart-tonic in existence.

Hydrochlorate of cocain, one hundred and twenty grains. (Always procure it in clean-cut, rhomboidal crystals.)

Hydrate of naphthol, ten grains.

This is antiseptic, I think, in the fullest acception of the term. I use it constantly to sterilize my instruments as the most convenient one that can be used.

Oil of cloves, two drachms.

Chloroform, two drachms.

Oil of cassia, two drachms.

Glycerin, one drachm.

Oil of cloves and the oil of cinnamon are of themselves largely anesthetic. The glycerin is simply a solvent to hold in solution the one hundred and twenty grains of hydrate of cocain together with the oils of the mixture.

I have heard it remarked that a solution of cocain cannot be maintained after a day or two; it precipitates and deteriorates. If you will incorporate glycerin with your watery solution, you obviate that difficulty. There is a solution of cocain in my office that is now some six months old, that is as efficacious to-day as it was the day it was made. I simply made it in boiling water, adding a little glycerin, and it holds it in solution perfectly if the water is free from impurities. I recommend this preparation to you with the greatest confidence.

DR. M. L. RHEIN, New York. In the past two years nearly all of the profession have been infused with a desire to find that substance which will produce painless dentistry. I differ radically with the advice the last gentleman has just given. I want to be as emphatic as possible in the disapprobation with which it ought to be met and stamped down by this body—the recommending of the universal use of so dangerous a toxic drug as cocain is.

There is a very large number of cases where it is almost impossible to use any valuable amount of cocain, without running the greatest amount of risk. I will not take a back seat with any gentleman in the profession in the effort to abolish pain in dental operations. I feel sorry for the gentleman that can't adjust a rubber-dam clamp painlessly. The application of cocain is useless unless it is introduced hypodermically. A mere application of the drug superficially on the mucous membrane, beyond the faith which you may instill into the patient or the delicate manner of your manipulation, will do no good.

There is one great detriment to the world at large that this seeking for painless dentistry is producing, and it is a thing that we ought to understand. The idea of trying to instill into the minds of the public at large that they should not at any time be the subjects of any little pain means physical degeneracy, a degeneracy from that Spartan-like character which was so much admired centuries ago.

There is a large percentage of patients that do not care for painless dentistry in the ordinary sense of the word. It is abso-

lutely nothing to them. They do not mind operations if they are done with a reasonable amount of care.

In that class of patients that we look upon as neurasthenic it is simply running the risk of making them victims to the use of an intoxicant, which cocain also is, and which numerous histories of the use of it has established.

In saying what I have, I do not want to leave the impression that I am opposed to the legitimate use of cocain in dentistry, for I firmly believe it has a well-established use, of great value to the practitioner if used with judgment. I refer now to that class of neurasthenic patients whose system is not anemic, whose hearts are in that condition that they can stand the use of cocain. With that class I believe that the careful injection hypodermically of a good amount of cocain, the hydrochlorate, before putting a clamp very deeply or before the immediate separation of the teeth by a separator, or in the extraction of a live pulp or a root, is a very valuable adjunct to dentistry, and one that can be recommended to every man who has sufficient knowledge of therapeutics to be enabled to know the proper drug that ought to be used as an antidote, or to take care of his patient if any ill effects follow.

DR. J. G. TEMPLETON, Pittsburg, remarked that he did not rise to dispute what the last speaker had said, but he wished to speak of some operations which he had himself witnessed in Dr. Hewitt's office, in which he saw the application of the preparation described by him. In the filling of a cavity in the mesial surface of the lateral incisor, the operator first applied to the gums a solution of chloral hydrate and naphthol for the purpose of absorbing and washing away the mucus on the gums, so that the pigment would take effect, and after an application of the cocain preparation, the application of the rubber-dam produced no pain.

"I saw the doctor extract the root of the tooth of quite an old lady, the second lower bicuspid. The gum was very much inflamed. He dipped a piece of cotton in his preparation, placed it over the root of the tooth, and after a few minutes extracted it without a twinge of pain."

DR. GEO. A. MILLS, New York City, commended Dr. Hewitt for his introduction of the idea of painless dentistry. In reference to the statement made by Dr. Rhein, the speaker said, now, the mere statement that cocain produces these results, and is dangerous and all that kind of thing, is mere trifling. I never have used Dr. Hewitt's preparation, but I have used cocain preparations with other drugs in combination, day in and day out, for sensitive dentine and for the soft tissues in the treatment of disease, and in my

experience so far there is not one single instance of adverse effect from it.

DR. J. S. LOWRY, Kansas City. I have used cocain in my practice for six or seven years. If there is any one thing that I would decline to give up in my practice, cocain would be the last. I use it both in superficial application and by injection. It is more efficacious, however, by injection. I use it more that way than any other. Before I began the use of the drug I studied all its physiological effects and all of its antidotes, and prepared myself to meet any emergency that might occur from its use. I use simply a four per cent. solution of the muriate of cocain plain and simple without anything else, in distilled water. I have it made fresh every day, and do not allow myself to use it when it is over two days old. I keep my syringe well sterilized. I have a syringe that I had made to order; it is much longer than the ordinary hypodermic syringe, so that you can reach any point in the mouth with facility.

One point that I think is one of the most important features of hypodermic injection of cocain, is, never inject cocain into the muscular tissue; if you do, it is carried into the circulation *en masse* to the heart, and you produce heart-excitation and sometimes nausea. But if you inject the cocain into the hard gum-tissue, being very careful that your needle is so located as to diffuse the cocain slowly in such a way that you can see the gum whitening gradually and the white surface gradually enlarging, you will rarely ever have any nausea.

DR. RHEIN. What are the anatomical relations of the muscles around and in gum-tissues?

DR. LOWRY. That depends altogether upon the location and what depth it has. You know the attachments of the muscles probably as well as I do. The muscles do not attach up to the gingival margin of the gum, there is no muscle attaches upon the alveolar process; the alveolar process is almost wholly covered with hard mucous membrane. In some gums the mucous covering over the alveolar process is very thin; in that case you cannot inject cocain with very much satisfaction. But, if the soft tissue is thick, over the alveolar process, you can inject cocain enough there by placing the needle only once on either side of the tooth. Do not change your needle frequently. If the needle is properly placed and I see it working nicely, I would hesitate about removing that needle to insert it in a different place.

DR. BIGELOW, Chicago, Ill. I have used a saturated solution of cocain upon the gingival margin in the application of the rubber-dam in very difficult cavities, where I am sure that patients would

have been entirely unable to stand the pain of forcing the floss beyond the margin enough to insert a gold filling properly if it had not been for the cocain. I simply took pulverized cocain upon my cement-tablet, and with a very small pledget of cotton dampened with water, sometimes with alcohol, dipped it in the pulverized cocain and applied it to the gingival margin. I think the gentleman would have pretty hard work to apply the rubber-dam in all cases painlessly, as he intimated he was able to do.

DR. N. S. HOFF, Ann Arbor, Mich. I do not believe in the indiscriminate use of cocain, for the reasons already stated, nor do I believe in using prescriptions containing supposed cocain antidotes, such as we have had presented here to-day. This prescription makes, as I figured, a twenty per cent. solution of cocain, or more. The effects of cocain are two—general and local. It is the local effect that we want, and not the general effect. But this prescription provides for counteracting the toxic effects of the cocain; it pretends to make provision against that in the use of sulphate of atropia and stropanthin; these are both heart-stimulants, or rather they stimulate the nerves that control the action of the heart. But the doses are too small for the amount of cocain that is used. This is a dangerous prescription, even used locally on the gums. You all know the histological structure of the gum-tissues, how slowly it will take up medicine; it absorbs slowly, yet at the same time it will absorb large percentages of cocain preparations, especially when such agents as chloroform and glycerin are used in connection with them. The cocain will be taken into the circulation and readily brought to the nerve-centers, and toxic effects will be produced. There is nothing at all in this prescription that is corrective. There is nothing that will hinder the dissipation of this drug or limit its dissipation in the tissues to which it is applied, and it will be taken up by the blood-circulation of the gums and carried directly into the blood-circulation throughout the entire system. The prescription I have no doubt will accomplish the local effects which Dr. Hewitt says it will.

DR. HEWITT. Let me ask the gentleman how about hydrate of naphthol as a localizer.

DR. HOFF. The hydrate of naphthol in saturated solution is somewhat of a coagulant, but in the strength in which you exhibit it it will not hinder the dissipation of this drug, so that I should expect to have bad results from the prescription.

I appreciate the effort that is being made to find a local anesthetic for use in dentistry as much as anyone. I use cocain contin-

nously, but I am more inclined to favor the use of the simpler solutions in water alone or in sterilized water.

DR. RHEIN. I want to correct a wrong impression which my words seem to have left. I do not question for an instant the ability to produce local anesthesia by any such prescription as that; the object of my remarks was to disparage the universal use of cocain, and I say that any such doctrine as that is damnable. I never intended to leave the impression that I disparaged the possibility of it producing the results. I am in the same position with the gentleman who said he had used cocain for six years. I have used it since it was first brought into New York City, and I use it every day; and I use it as he says he uses it, I prepare a fresh solution with distilled water, and only use it during that day, and I believe it is the safest way. But I use it with discrimination, that is the point I wish to impress. The gentleman stated he used it universally, and he recommended it universally, and that is the danger-point in any such advice.

DR. G. A. MILLS, New York. What does he mean by universal?

DR. RHEIN. Every place in any form.

DR. MILLS. He meant for painless operations.

DR. RHEIN. As I understood it, whenever he put a patient in a chair and adjusted the rubber-dam. I want to say I never perform an operation on any tooth without first applying a rubber-dam.

DR. MILLS. Have you ever used preparations of this kind in combination with cocain?

DR. RHEIN. I have.

DR. MILLS. Have you found the result which you say is damnable?

DR. RHEIN. My remarks about the use of it were intended to express the feeling I have that it is damnable to ask dentists to use cocain on every patient that presents, because there is a large percentage of patients you cannot use it on, or if you do you will end in the penitentiary.

DR. MILLS. I commenced practice before that gentleman was born, and I now put my statement here to show what I have found in intelligent practice. I don't mean that I use this preparation for everything I do in my office, but I use it where I expect to decrease pain, and emphasize the fact that I have never seen any adverse conditions following it.

DR. BIGELOW. The two statements of Dr. Rhein seem to me to be inconsistent. One was he did not believe that the external application of cocain on the gums would amount to anything; he did not think that the gums could possibly absorb enough to pro-

duce local anesthesia; now he says he thinks it is dangerous to use this pigment of Dr. Hewitt's indiscriminately.

DR. RHEIN. I intended to make clear that you cannot get perfect local anesthesia by that method; but you will get a much greater general effect; that is, the whole system will be more affected by the topical application.

DR. A. C. HART, San Francisco. There has been a great deal said upon the subject of cocain, and some of us who are young in practice would be confused and go home from this convention and not know what to do. Really nothing has been said as to what cocain is, or how it acts. The gentleman to my right has just said he did not think you could bring about local anesthesia with cocain by applying it locally.

DR. RHEIN: I did not say anything of the kind.

DR. HOFF: If any of you will go into the offices where men work upon the eye, you will see them put cocain upon the eye and perform very delicate operations without any pain being experienced.

DR. HEWITT: In reply to my friend, Dr. Rhein, when I advised the use of cocain, I did it advisedly, knowing I was talking to men of education, of refinement, and careful thought. Have I got to go into the minutiae and tell them that they must not give a neurasthenic patient cocain, or a fat man might be a proper subject to use it upon, or that a delicate woman shall not have it, or a little child, and so on? I took it for granted that these men know something. I had only a few minutes, Mr. Chairman, in which to present this. I would like, if I had time, to tell you how I use it, and I defy my young friend to prove that the application of it is damnable.

I have only to say this: I have used that pigment for a long time on all sorts of patients,—upon patients with heart-disease, with kidney-trouble, with one side paralyzed, with brain-trouble, and every conceivable disease that has come into my office, and so far as I know without the slightest toxic effect. Why? Because enough of it cannot be absorbed in the way I use it to enter into the circulation; if it were all put into the stomach at once it would not hurt a baby. Will my friend tell me how much cocain must go into the stomach to produce a toxic effect? He doubtless knows. If he does know, then he knows that that pigment, diluted as it is, applied to the gums cannot hurt a baby.

I ask you as humanitarians, as men of science, to think of this, read upon the subject, and write to me and ask any questions that you please, and I will answer them with the greatest of pleasure.

DR. J. G. TEMPLETON, Pittsburg, Pa. The question has been asked here, "Why does not some one tell us how cocain acts?"

Does anybody know? We know that opiates all produce certain soporific effects; can anybody tell you how they do that?

DR. CRAVENS. The discussion yesterday and the papers on the subject up to that time in this Section were devoted exclusively and absolutely to the subject of the extraction of teeth, and I protested that there ought to be something else referred to in touching upon the question.

DR. HORTON. The experience we had in our office in regard to the use of cocain was that it was very useful in the soft parts and not very useful in the dentine. I have never used it by injection.

At this point the paper of Dr. W. C. Davis, of Lincoln, Neb., upon the subject of obtunding the sensibility of the dentine was taken up and read in the absence of the author. (See DENTAL COSMOS, current issue, page 762.)

On motion, the paper of Hedwig Bensow Stahlberg, of Helsingfors, Finland, was read by the chairman, as follows:

ETHYL CHLORID AS A LOCAL ANESTHETIC.

I desire to offer a few suggestions in relation to an anesthetic that has recently been highly spoken of in our profession.

Professor C. Redart, of Geneva, was, so far as I know, the first to speak publicly of this remedy, and he demonstrated its practical application at the International Congress of Physicians in Berlin, 1890.

The agent is chlorid of ethyl. Its application is very simple and its effects, after a little practice, generally very satisfactory.

Professor Redart made his demonstration at Berlin in an operation upon the upper jaw by applying the spray behind the angle of the lower maxillary bone, in the region of the *spheno-maxillary fossa*, and also in an operation upon the lower jaw, where the inferior maxillary nerve proceeds from the mental foramen. In experiments of similar nature by others as well as by myself, the results were not satisfactory.

In the *Blatt für Zahnärzte*, of January, 1893, Hjalmer Carlson, one of the directors of the Dental Institute of Gothenberg, illustrates the use of the agent very much as I use it, and with which I have secured most excellent results.

In the use of ethyl chlorid, I apply it directly on the gingiva and to the immediate neighborhood of the root or roots of the tooth to be extracted. I cover the other teeth in the same jaw, and the inside of the mouth, as well as the tongue, with prepared cotton, be-

cause I find that the cotton lies more closely to the surrounding parts than a napkin, as proposed by Professor Carlson.

This cotton covering should be carefully made, so that it at the same time prevents the saliva reaching the locality to be anesthetized and also prevents the patient from swallowing any of the agent.

Just as in using other local anesthetic agents, the time required to secure insensibility is very variable. Some patients require only about one gram; others three or four grains, and exceptionally even more. In one case I found that ten grams were necessary.

These circumstances, however, are unimportant, because the agent is very harmless, and it is so cheap that the poorest patient can afford to have it used.

Let me emphasize the necessity of carefully covering the parts of the mouth not to be touched by this agent, because if saliva reaches the locality to be anesthetized it not only retards the anesthesia, but often renders it impossible.

I apply the fluid solely in the region outside of the affected tooth.

If the ice-crystals do not quickly appear on the gingiva, but the finger feels cold with which I hold the cotton layer on the inside of mouth, I immediately proceed with the operation—and generally to the satisfaction of the patient.

Professor Carlson's suggestion to wind a warm napkin around the tube containing the anesthetic I will recommend to everyone who uses it; because the evaporation is thus quickened, and the result, therefore, more successful.

I desire to render popular this happily discovered remedy; for I consider it excellent to overcome the annoyance and suffering which is inseparable from the practice of our profession. During the whole operation I usually stand behind the operating chair.

I recommend this agent as put up by Dr. Bengue, in glass cylinders containing about ten grams—not on account of the preparation itself, for that of Gaillard P. Monnet and Cartier (Lyons) in glass cylinders also of about thirty grams—is just as good; but because Dr. Bengue's method of confining the fluid is simple and perfectly secure, while that of the latter is complicated and uncertain. Another excellent local anesthetic is, as is well known, compressed carbonic acid; but its distribution is as circumstantial as it is expensive. It is difficult of transportation, and requires an expensive apparatus for its administration, and it must be preserved in heavy iron cylinders.

DISCUSSION.

DR. LOWRY. I want to speak of one point made by Dr. Davis of Nebraska, which I think is a very good one, that the tubuli of the dentine are not occupied by a nerve-filament; the nerve must be nourished by blood circulation. The tubuli of the dentine are too small for the free circulation of the red blood-corpuscles, the red corpuscles being three-ten-thousandths of an inch in diameter and the tubuli only one-ten-thousandth of an inch or one-third the size. Consequently there can be no blood-nutrition to that nerve. Secondly he says it is a protoplasm. I think that is a good point. The tubuli are occupied by protoplasm. His idea is to apply warm alcohol to the cavity of the tooth and by its evaporation extract the protoplasm, thereby disposing of the conducting medium or the medium that conducts the sensation from your instrument to the nerve or the pulp proper.

I have used warm alcohol for probably eighteen months or two years almost to the exclusion of anything else for obtunding the sensitive dentine. I knew it was of benefit, though I did not know why, but this idea of the essayist has brought it clearly to my mind what the alcohol did do, by its action upon the dentine protoplasm. He fills the tubuli again with some essential oil. I do not know whether it is a good point or not.

So far as the chlorid of ethyl mentioned in the last paper is concerned in its application for the obtunding of sensitive dentine, I think it is the most painful thing that was ever administered or put in a cavity. I do not think its effect is so painful upon the gum, but to place it within a cavity for the obtunding of sensitive dentine it will inflict more pain than the excavation of the cavity without the use of an obtundent.

DR. CRAVENS. Some twenty-one or twenty-two years ago I learned to obtund the sensibility of dentine by the use of alcohol. I was told to use alcohol of a good quality, but nothing was said about absolute alcohol, and for a number of years it never occurred to me what the difficulty was. In some cases I would have very indifferent success, and in some cases none at all, and finally abandoned it. I was lately induced to take it up, and have since applied the absolute alcohol. My observation of absolute alcohol is that the moment you warm it and apply it, it evaporates and does not stay long enough to have any effect, so I have resorted to the simple cold blast. That reduces the temperature of the tooth, but reduces it in a way which is not necessarily painful. After that has been continued a while I can get it to a point where I can apply ordinary alcohol, say 90 per cent., and evaporate that and follow it with the

absolute alcohol, of which I have a bottle right at my hand, and apply it with a little pellet of cotton, with the current of air from the full force of the syringe going continuously, keeping it up one or two minutes.

DR. RHEIN. In the introduction of chlorid of ethyl in the past few years, a great many have been led to confound it with chlorid of methyl. Chlorid of ethyl is so different from the chlorid of methyl that it takes about a hundred minutes in the use of chlorid of ethyl to produce by its evaporation a reduction of temperature equivalent to between zero and ten degrees above zero, Fahrenheit, while chlorid of methyl by its greater volatility in the course of five seconds will produce a reduction of temperature equivalent to seventy degrees below zero—it will freeze the mercury in the bulb of the thermometer in five seconds. I introduced into dental practice the chlorid of methyl some five or six years ago, with the object of painlessly excavating a certain variety of sensitive cavities, and I use it to-day very successfully for that purpose, but I discriminate with that material in the same way that I believe every intelligent practitioner ought to discriminate in regard to everything he uses. I find the use of the chlorid of methyl almost indispensable, because of the small amount of material required to freeze a limited amount of space in an infinitesimal space of time. Now the danger of it is the possible effect on the pulp of the tooth, and it must not be overlooked. In all the length of time I have used it, I have not to my knowledge had any bad effect on the pulp apart from some slight irritation of the pulp following in some cases where I was impelled, more through a feeling of investigation than otherwise, to use it in a deeper cavity than I would use it to-day; but in those very sensitive labial and buccal cavities where we really find the greatest difficulty in commencing to excavate, or where we want to build up the tooth that is very sensitive, in fact all cavities that are remote from the pulp, the most infinitesimal amount of the fluid sprayed from the cylinder direct on the tooth will produce an immediate insensibility of the part if it is used with some little intelligence, but all you require is a very small effect. If you allow it to come out in a minute stream in the way in which the chlorid of ethyl comes out, you can entirely remove the pulp from a tooth by its means.

A paper by Dr. D. Caracatsanis, of Athens, Greece, was then read, as follows:

TREATMENT OF ALVEOLAR PYORRHEA.

The symptoms and causes of this affection have been carefully studied from the standpoint of Messrs. Magitot and Galippe's views. I shall speak upon the treatment and cure.

From the point of view of the severity, I consider the malady as separable into four degrees, as facilitating the application of the treatment which I recommend.

I regard the disease as of the first degree when the suppuration has only extended to the neck of the tooth, the alveolo-dental periosteum being unaffected. The cure of this stage is extremely easy by the following treatment: In the first place, the tartar or other irritating deposits are to be completely removed; the gums are to be scarified as thoroughly as possible with a steel instrument wrapped in cotton, which should as a preliminary be dipped in a 1 to 1000 solution of sublimate. This is at once followed by an application having the following composition:

Tincture of iodine,

Tincture of aconite, equal quantities.

The patient is directed to cleanse the mouth thrice daily with a brush and the following antiseptic lotion:

Tincture of thyme, 2 grams;

" " eucalyptus, 1 gram;

" " benzoin, 4 grams;

" " mint, 120 grams;

" " lavender, 2 grams;

" " rosemary, 1 gram;

cologne, 2 grams;

" " anise, 4 grams.

Sig.—One teaspoonful in half a glass of water.

Have the patient return at the end of a month; he will be entirely well if he has followed directions.

Second degree; suppuration having extended to the upper portion of the cement. Treatment the same as for the first degree, only it will be necessary to have the patient return several times for scarification and painting of the gums. The cure will be complete at the end of two or three months.

Third degree; suppuration involves the whole of the cement and the periosteum, but the teeth have not given way entirely.

The visits must be more numerous, and the strength of the sublimate solution is to be increased to 2 to 1000. After scarifying the gums by means of a bistoury, I introduce with a Pravaz syringe the sublimate solution between the tooth and the gum, and at once apply the iodine and aconite preparation.

If there be inflammation and the patient suffers pain, after remov-

ing the tartar I order emollients to relieve the pain before scarifying and employing the sublimate. Cure is not yet obtained in this degree of the malady. I continue the treatment until all suppuration has ceased and the teeth have become almost immovable. It is possible to get these patients to masticate with comfort who have had the severest suffering, and in whom the slightest pressure occasioned almost unbearable pain.

As to the fourth degree, which I define to exist when the teeth are altogether loose, the same treatment is to be employed, although a satisfactory result is rarely obtained. I have had some half-cures for a time, but it is only in persons with abundant patience; usually the patient becomes wearied before experiencing the slightest improvement.

The meeting was here adjourned to meet at 2:30 P.M. Thursday.

SECTION V.—DENTAL AND ORAL SURGERY.

The Section met at 2:30 P.M.

The chairman, Dr. Brophy, said: The chairman of this Section was expected to make some remarks at the opening yesterday. The remarks that I desire to make are, in brief, that surgery pertaining to the oral cavity is within the domain of dentistry. Surgery, as practiced by the oral surgeon, may be done by any one taught in our dental schools on the special subject. It has been said that dentists should not make operations beyond the teeth, because if the oral or dental surgeon makes an operation, and it results in injury, or is not a success, he lays himself open to legal prosecution for want of education in that particular department. I hold, and always have held, that the graduate in the school of dentistry who has listened to lectures upon any subject may practice in his special line without any more danger of being prosecuted.

These topics have been brought out so frequently in dental and medical societies, I thought it important to speak of them. I hold that any dentist educated within the schools of dentistry on the lines taught, is authorized under the laws of the state chartering the institution, to practice in either department and has equal rights to administer remedies, and perform surgical operations with the general surgeon.

Dr. Crawford, of Nashville, was called to the chair, and a paper was read by Dr. Brophy, of which an abstract follows:

In looking over the history of staphylorrhaphy, the reader will be struck with the likeness of complaints, the three principal of which seem to be the difficulty in tying the sutures, the great ten-

dency of the sutures to slough out after they are once nicely secured, and the concealment of the parts during operation, both because of deficiency in light and the accumulation of the viscid muco-saliva which in mouths thus affected is secreted in such abundance.

In my judgment it is sometimes best to divide the operation into two stages, making the first the operation on the hard palate, and subsequently, after the process of repair is complete, an operation on the soft palate. If, however, the operation is to be made on both the hard and soft palates at the same time—and this is sometimes admissible—the edge throughout the entire length of the fissure should be first prepared. The operations that have been performed by Fergusson, Warren, and others on the hard palate have their advantages, and are commendable in cases of adults oftentimes, but in early infancy the new operation for the radical closure of the hard palate, as devised by me, will now be dealt with. The operation for the closure of cleft palate is one more or less dreaded by the general surgeon, both on account of tediousness and the not altogether satisfactory results. He then described the operation as follows:

First, place the patient on the table, face toward the light, introduce the oral speculum, and vivify the fissure; do it thoroughly, and with a bold hand. A mere scraping of the mucous membrane will never suffice to bring about union which will be permanent and satisfactory. On the hard palate, trim the opposing surfaces of the bone as well. This well done will secure sufficient exudate to make the operation a successful one, in this respect at least. The knife will easily cut through the soft bone of the hard palate and alveolar process of young patients. Then raise the cheek, and well back toward the posterior extremity of the hard palate, just back of the malar process, and high enough to escape all danger of not being above the palatal plate of the bone, insert a large braided silk suture, carrying it through the substance of the bone, so that it will come out at a corresponding position upon the opposite side. The silk suture is more easily introduced by the needle than the wire, but a wire or suture of silver should be substituted for it, and this wire may be doubled, in case the condition of the parts and the tension upon the tissues necessary to approximate them seem to require it. Nearer the front portion of the palate insert another wire, carrying it through the substance of the bone above the palatal plates and out through the bone in a position corresponding to the place of entrance. Then we have a wire passing over the palate in front of the malar process of the bone, and another behind.

The next step is to take a lead button, molded to fit the convex-

ity of the part and long enough to pass beyond the exit of the wire sutures, so that the sutures will pass through it. Have it provided with eyeholes, through which are passed the protruding ends of the wires, and upon both sides twist the wires together, that is, the right side end of the anterior wire and the same on the left. It is better practice to always twist wires in one way, either from right to left or from left to right. These sutures are heavy tension sutures, and, once approximated, the parts cannot be separated by the patient. If we are unable to close the fissure with these wires, if from lack of tissue or from firm resistance of the parts this cannot be done, there is a further method to be employed which will obviate these difficulties. With your knife after the cheek is well raised divide the mucous membrane just over the malar process. Here insert a knife in a horizontal direction, and when well inserted sweep the handle around from one side to the other, as from behind forward. In this way a maximum amount of bone is divided, and a minimum amount of the mucous membrane. This done on each side, the bone can very readily be moved toward the middle line. Having thus divided the bones upon either side, the wire sutures passing through the lead buttons may again be twisted, and the cleft of the hard palate will be easily closed by approximation of the two sides. The incision in the mucous membrane in making the separation of the bones is as small as possible, for the reason that this membrane must serve to retain the bones in proximity or to hold them nearly together. If, after the parts are approximated, they are kept antiseptically clean, the bones will kindly unite, and the palate will be restored so that its full function will be performed. Separation of the bones is attended with little hemorrhage, and the parts do not usually cause more inconvenience to the patient than the ordinary operation of lifting the hard palate according to the practice of Fergusson.

The germs of the teeth are sometimes disturbed, as I have found later when they are erupted that certain teeth were imperfectly formed. This applies only to the molars of the temporary set, but it is not unlikely that the germs of the permanent teeth may also be disturbed, and the teeth made imperfect by this procedure. The palate, too, may be contracted to an abnormal extent, and yet it is a well-known fact that the alveolar processes develop with the eruption of the teeth, and my experience has convinced me that in mouths thus treated the teeth of the upper antagonize in a normal way with those of the lower jaw. If, however, the upper superior arch should be abnormally contracted, and when the teeth erupt fail to properly antagonize with their fellows of the lower jaw, the means well known

to the modern dentist may be employed by which the arch can be expanded and the slight abnormality removed. After the approximation of the edges in the manner I have described, the parts should be thoroughly dried, edges of the wound carefully examined, and if need be some fine sutures inserted here and there to insure perfect coaptation of the parts. The after-treatment is very simple, consisting solely in antiseptic cleanliness, nourishing the patient upon liquid food, the prevention of disturbance of the parts on part of the child, or the introduction into the mouth of anything that might interfere with the sutures. Abrasions of the mucous membrane caused by the buttons need not disturb the operator, for they are usually slight. So much for the operation for the radical closure of the hard palate.

The soft palate may be closed in the usual way, and it may be best accomplished by the use of a needle invented by Dr. Prince, of Jacksonville, Ill., with Dr. Black's "pick-up," which simplifies the operation and renders its performance easy. I regard silver sutures the best.

I desire particularly to enter a protest against the division of the tensor-palati muscle, so frequently divided by surgeons with a view to relieving the tension upon the palate, and thus rendering its union more certain. This muscle once divided will never unite, as retraction of its fibers will occur instantly after its division, and we have consequently one of the most important factors in the anatomical structure of the palate destroyed. The tension upon the freshly approximated surfaces or edges of the wound of the palate may be relieved in another, and what I consider a far better way—better because the function of an important portion of the palate is by this means not destroyed. It consists in passing a wire through the borders of the tensor-palati muscle, as the muscle winds around the hamular process of the palatal bone, and fixing the loop with a large bead resting upon the visible surface of the hard palate, directly over the tensor-palati muscle. The wire passing through the bead and muscle is carried also to the opposite side, and thus pressure is brought to bear upon the fibers of this muscle which will temporarily paralyze it, and thus remove the tension from the freshly approximated surfaces of the palate after the process of repair is complete; and this tension suture removed, the muscle will soon resume activity.

It must be remembered that a surgical operation to be a success must leave the patient with sufficient palatal tissue to perfectly close the posterior naris during articulation. An operation may be surgically a success, but if there is not sufficient tissue to close the naris

in the articulation of sound it will not be a physiological success. When there is insufficient tissue in young persons and adults to secure the closure of the posterior naris by operating, the correction of articulation is best accomplished by means of artificial vela; but whatever method of treatment of congenital cleft palate may be adopted, improvement in the voice must be gained to a very great extent by education. The patient has in the first few years of life acquired imperfect habits of speaking, and particularly the guttural and nasal tone, which requires great care to overcome. It is essential that he should be taught to speak with his lips and to throw the voice forward. With proper teaching and diligent practice he will in time speak as distinctly as the majority of persons whose palates are normal.

Lastly, I desire to say that the subject of hare-lip is one which is so extensive as to preclude its introduction into this paper.

At the close of the paper, Dr. Brophy exhibited a mouth-speculum, specially prepared for use in operations upon the palate. A patient was also introduced showing the result of a successful operation for cleft palate.

DISCUSSION.

DR. BARRETT. I have known of the operation and have watched some of the cases, and I believe honestly and candidly that it is the most important and radical improvement in surgery that has been presented by a dentist. I believe it is something that is radical. I wonder that the world of surgery has not seen the point before. I have heard all sorts of objections urged against it. But I have had an opportunity to see a number of operations, and it does seem to me that it is marvelous. I saw the child yesterday from whom this impression was taken. This was a new and untried operation, and yet its success has been far beyond what could have been anticipated. The child was poorly nourished. There was almost inanition, yet not such as to make the operation dangerous. It was performed at the age of ten days. Previous to that, it was with the utmost difficulty that the child could take any nourishment. Its parents told me that almost from the day of this operation, the child commenced to improve. This has continued down to the present time, and the child is now two years and six months old. It is a complete and radical cure. The child had double hare-lip. It had complete fissure, not only of the soft palate, but of the hard palate, complete and entire. The idea of puncturing a suture above the alveolar arch and maxillary plate, and forcing the sides together, so as to make a complete union possible, was rather a daring operation for the first one. The success is marked. The child is not

forward in its intellectual growth, yet it speaks some words, and all the sounds the child makes are complete—I do not mean to say perfect, because you do not expect them to be perfect in such a case as this.

Dr. Brophy has said very little about the operation, and one reason I presume is, that he wished to have ample time to have it thoroughly established. Prof. Senn says it is one of the few original surgical operations, and he proposes it to be known as the “Brophy operation.” It is entirely original. It is radical. If the palate can be closed together by nature, is not that better than the wearing of any artificial appliance? It seemed to me, when first presented, that the idea of such a radical operation to be performed on a child so premature, and at the early age he recommends, was a dangerous procedure, but I have changed my mind. The nervous shock to a child is not what it is to an adult. If the child be sufficiently nourished, there is nothing more than the mere surgical shock, and not the shock which would be produced by apprehension upon the mind of an adult, and I believe he is quite right from that standpoint in operating at the early age which he does; and another reason, we know the bones are more easily brought together. It is only necessary to remove enough tissue so the edges can be adapted. What can be more surgical or physiological than that? There is the cast of a mouth upon which the operation was performed nearly two and one-half years ago. The muscles have developed. Muscles must necessarily atrophy from disuse, but in this case they have been brought into partial use, and you have a pharynx almost equal to that of the child born with a natural palate.

I believe, when a man has done something that is a credit to each of us, that credit should be given to him, and I know the whole credit of originating this operation should be given to Prof. Brophy.

DR. BREWSTER. I think, with Dr. Barrett, that this is something which we will all appreciate more and more as time goes on, and the method of bringing those parts together is better understood.

DR. CASE. I have been aware that Dr. Brophy has been doing this operation for some time. I have seen him operate, and seen the result of the operation. It is certainly successful in every way, and is perhaps the very best method of closing the opening produced by a congenital cleft of the palate. This operation should be performed soon after the child is born. But, gentlemen, after all, what is the object? It is for the perfection of speech, almost entirely and alone. Within the past few months I have had as many as four cases operated upon for cleft of palate late in life, where the cleft was entirely

closed, and speech has not been restored, simply because there was not sufficient tissue to close the naso-pharyngeal opening. When an operation is performed in that way it is not a success, but if it had been taken in early childhood, then the muscles and all the tissues will develop with the growth of the child, and speech will no doubt be perfect. But in later life, while the operation may be successful, they rarely talk with perfect distinctness of tone and articulation. I have had a patient wearing an artificial palate, and no one would detect anything wrong with his speech. He commenced early in life, at ten or twelve years of age, and has worn it about ten years. Even later than twenty years of age it is difficult to succeed with artificial apparatus, so they will speak distinctly without the nasal tone.

I agree with Dr. Barrett that too much praise cannot be awarded Dr. Brophy for the very ingenious and perfect manner in which he performs this operation.

DR. PARSONS. I have never seen an operation performed this early in life, and I would like to ask if the closure is immediate at this early age.

DR. BROPHY. Yes, the closure is immediate.

DR. MOLYNEAUX, Cincinnati. I would like to ask whether any conditions beside those of health would prevent him making that operation, or would preclude the possibility of successful speech, regarding the size of the cleft, and position and arrangement of the palatal muscles.

DR. BROPHY. If the bone is divided at the point of the palate where the greatest tension comes, the tension of those muscles would be relieved, and that is one of the features of this operation that I regard as especially important. After the hard bone is brought together, the strain upon these muscles of the palate is thereby relieved. The paring of the edges is made in the usual way, and I think I enumerated in my paper all the conditions that are unfavorable. It is not well to operate during any eruptive skin-disease. The child must be in good health.

DR. MOLYNEAUX. The object of treatment of the cleft palate is to produce a perfect articulation. In the patient exhibited to-day, it showed excellent results, and it seems to me that one must consider the possibility of successful speech, before beginning the operation. There are physical conditions which would preclude the possibility of articulation. I have two patients that I know of, where the operation was made after the plan of Langenbach, and there was complete closure of the parts, hard and soft, before the patient was a year old. The child came from a bright family, and

had good training, but never learned perfect articulation, from the very fact there was not sufficient tissue for the soft palate to perform its function. In making these operations, considerable time must be spent in taking the size and quantity of tissue. See that it is sufficiently closed to have the soft palate perform its function properly. I have seen some two hundred cases of cleft palate, and made casts of them, and you will find every form and size in the pharyngeal cavity. There are cases where the pharyngeal cavity is shallow, and the operation is then a success, but if there is any considerable distance between it and the posterior wall of the pharynx, then the operation will not do any good to the patient. I know the patients can usually speak as perfectly with an artificial palate as I am speaking to-day. I am in hopes the time will come when good results can be reached in infant life.

DR. CURTIS. I would like to ask what success Dr. Brophy has had after the eruption of the teeth.

DR. BROPHY. The only difficulty is, the breaking up of the antagonism of the teeth; and that is one reason why this operation should be performed while the child is young. That is one of the principal disadvantages in later life, that the occlusion of the teeth is broken up, and the operation is more difficult at a greater age, because the bone is harder and does not so easily yield. It must not be understood that this bone is cut the entire length, like the plaster cast; the bones are only divided at the malar process. I have operated on children eighteen months old, while the teeth were in, and succeeded in getting the parts together, and proper antagonism of the teeth. I might advise such an operation in an adult. I have made but one operation on a person beyond twenty years of age in the manner I have described, and that was successful.

DR. FILLEBROWN. What gain is there in doing it in this way, where a person is over twenty years of age, over the old method?

DR. BROPHY. There is no special gain in subjects of that age, only it takes the tension off from the muscles, and enables the parts to heal without being separated by tension of the muscles. If the tensor muscle is divided, it will not unite; and if once lost, no matter how well the operation may be performed, or how successfully it may unite, the tension of the palate will be forever lost.

DR. FILLEBROWN. I should differ with the chairman, from cases which I have seen and which I have done myself. Only a few months ago I made such an operation, and if I know what I saw, I separated the muscles, and the function of the palate was increased. I saw a patient some years ago operated upon by Dr. Gordon. I defy any man to tell that any operation had ever been performed, unless

they looked closely into the mouth and saw the cicatrix. I understand Dr. Rose, in his late work, says the function of the palate was destroyed after the muscles had been separated. I do not see why it should not be so; if a nerve should unite after two inches was cut away, or if a tendon will unite where two or three inches were separated, I do not see why the cicatricial tissue cannot unite the tensor muscles. My own experience is that it is done.

I am not saying this in criticism of Dr. Brophy's operation. I admire it, and it is a good thing. I would ask a question further, whether it does not cause a subsequent contraction and narrowness of the face that might be avoided by the other operation? Or does it expand itself again afterwards?

DR. BROPHY. These models will answer the question better than I can otherwise do.

DR. BARRETT. Dr. Brophy proposes to perform this operation very early in life. He proposes by paring down the edges, and forcing together the two sides of the superior maxillary bone, to reduce the size of the arch and reduce the tension upon the muscles.

He objects to the severing of the palatal muscles, and I think with good reason. He simply brings together the two sides of the maxillary bone, and by reducing the tension there is opportunity for growth of tissue that will fill up there, whereas if it is a staphylorraphy operation, it is taken away. Dr. Brophy's operation commends itself to me because it saves those muscles, the action of which is so supremely important in after-life. The doctor does not claim it is to supersede other operations, but if it is adaptable in one case out of a hundred, the operation is important.

DR. CRYER. I have had an opportunity to see a few of these cases at the College of Oral Surgery, with which I have been connected for the last twelve years. I admire this operation in early childhood, before the eruption of the teeth. After that, I have my doubts of the operation. The advantage of placing the sutures in position, before freshening the edges, is that the blood does not in any way interfere with the seeing or causing the patient to move while the stitches are being placed. Since using the corundum-stone driven by the surgical engine for freshening the edges of the soft tissues, it strikes me that it can be used to a great advantage in freshening the edges in the staphylorraphy operation, as very important tissues can be saved in this manner. The objection to cutting the tensor-palati muscle is on account of its relation to the opening of the Eustachian tube. If it is cut, the function of the tube is interfered with, which is liable to produce deafness. A better name for the muscle is the palatal-Eustachian.

DR. MORGENTHAU. I took great pleasure in listening to the address of Dr. Brophy. I think the doctor ought to be congratulated upon devising a means to avoid the cutting of the palatal muscles. As an aurist, I commend very highly Dr. Brophy's operation.

DR. BROPHY. In closing the discussion, I only desire to give the Congress and the individual members my thanks for the compliments they have so generously bestowed upon me.

The Section then adjourned till 2.30, Thursday, August 17.

SECTION VI.—OPERATIVE DENTISTRY.

This Section was called to order at 2.30 P.M. by Dr. McQuillen, who presided.

Dr. Emil Schreier, of Vienna, Austria, read a paper in German on "The Treatment of Infected Root-Canals with Kalium-Natrium."

Following is the translation:

THE TREATMENT OF INFECTED ROOT-CANALS WITH KALIUM AND NATRIUM.

I have taken the liberty to request a place on the program of this distinguished body for the reason that I entertain the hope that the subject of my paper is of such importance for daily practice that it cannot fail to arouse the interest of a large proportion of those present. It is my purpose to lay before you a procedure for the antiseptic treatment of infected root-canals, which from its great simplicity and ease of application, as well as on account of the many excellent results which have been obtained therewith, deserves consideration from this distinguished assembly. I refer to the method of treatment introduced by me with kalium-natrium (potassium and sodium).

For the sake of brevity I shall limit myself to developing the principles which underlie the method. Should I succeed in arousing the interest of the audience, discussion will undoubtedly take place, when I shall have the opportunity to express myself more at length upon this subject, which I have thoroughly elaborated. When a tooth with gangrenous or necrotic pulp comes under treatment, the dentist is confronted with the task of removing as far as possible a gelatinous, slightly consistent mass from a capillary tube, and this having been accomplished to introduce into the same canal an antiseptic for purposes of disinfection. You are all aware how much time, patience, and skill are necessary for this operation. The average dentist has enough trouble in many cases in simply probing the canal with a delicate needle, not to speak of cleansing, and much

less filling the same; he is accordingly compelled to leave out of consideration any thought of saving the tooth. Such cleansing, however, is unnecessary, if it be possible to convert the septic contents of the canal into an aseptic condition, and the operation is much simplified if it be possible to effect the transformation by the simple introduction of a nerve-needle.

My method seeks to fill the first indication by a chemical decomposition of the putrescent contents, in which the root-canal serves as a test-tube; the second indication is fulfilled in the development of a substance which is readily taken up by a nerve-needle, and sufficiently adhesive for introduction into the canal. This substance which you here see consists of kalium and natrium in a metallic state. I pierce its paraffin stopper with a nerve-needle chosen at random. You observe a delicate deposit resembling quicksilver on the needle. I now dip the needle in a glass of water; the needle describes a fiery tract therein. In the root-canal in question there exists a putrescent mass. This consists of water and the decomposition product of albumen, the latter consisting especially of fats and fatty acids.

These substances have been formed by the influence of bacteria, and serve as a culture-medium for the various species contained therein. If I now introduce my preparation into the canal with the needle, decomposition of the watery contents will occur, with development of a considerable amount of heat. Potassium and sodium hydroxids are formed, which in combination with the fat of the pulp form soap. The characteristic gangrenous odor is accordingly changed into a well-marked soapy smell. A portion of the alkalies possess the well-known property of rendering albuminous substances soluble. Thus any remains of tissue adherent to the walls of the canal are dissolved, the latter become macerated, and access to the dentine canaliculi is possible sooner than can be effected by any other method thus far employed. Destruction of the organic contents of these canals is now possible. You will readily understand that in consequence of such destruction the disagreeable discoloration which too frequently occurs will be absent, and that the lime-salts of the tooth proper are in no wise injuriously affected by the treatment.

The introduction of the potassium and sodium has the additional effect of destroying the bacteria, partly by the heat produced, and partly by the new products formed. The contents of the canal have been transformed into a sterile and probably antiseptic mass, and thus the development of new colonies of bacteria is prevented.

Everything has thus been accomplished which precedes permanent filling of the tooth.

A series of questions will no doubt spontaneously arise in your minds which will take form somewhat as follows: Have any particles of the septic contents of the canal been forced through the apical foramen before sterilization has been complete, and so caused infection of the alveoli? Has the destruction of the bacteria been shown to have been certainly accomplished? And finally, does the preparation adhere to the nerve-needle sufficiently to be easily transformed to the canal?

It will not be difficult to give a satisfactory answer to all these questions. I hope to have the opportunity of demonstrating my method on the living subject, and you will see how the transmitted mass travels in the direction of least resistance—that is, into the orifice of the canal next the pulp-chamber, and wells up alongside of the needle. But the results of practice better than mere theoretical deductions demonstrate the groundlessness of such apprehensions. Reports from various sources are at hand as to the results of the preparation in practice. They are all eminently satisfactory. This would be impossible if the infection of the alveoli had occurred in any but the most insignificant proportion of cases. That the bacteria are actually destroyed, I have proven by cultivation experiments, with the full description of which I shall not weary you. Hardly anyone would seriously doubt the possibility of the method practiced by me in effecting the destruction of organic life. I shall best succeed in convincing you that the preparation has sufficient consistency to adhere to the needle, by passing it around in actual contact with the needle. I shall probably have an opportunity of expressing myself upon various questions which may be raised in the discussion. It is scarcely necessary for me to state that my plan of treatment should only be practiced with the coffer-dam. In an assembly like this, this fact will appear self-evident. Of course care must be exercised in manipulating with the preparation. With proper care the preparation is free from all danger.

A further question may be raised, whether the methods heretofore employed do not give satisfactory results—that the introduction of a new one is superfluous. I believe that I am entitled to say that the plan of treatment proposed by me is founded upon correct principles, and meets the obvious indications as regards ease and rapidity of application and certainty of result. It is, to say the least, the equal of any method. Every practitioner is in a position by the aid of my preparation to save with rapidity, ease, and well-

nigh with certainty, teeth that have been seriously affected, and that without special preliminary preparation and without troublesome appliances. Thus the benefit of treatment of the root becomes possible for the masses. Inasmuch as the greater portion of mankind is forced to lose the teeth for lack of the means of calling in the aid of the dentist at the proper time, I assert that my method marks an important epoch in the progress of root-treatment, and I take the liberty of requesting you to submit the method proposed by me to your distinguished consideration.

DISCUSSION.

The question was asked if these chemically prepared needles vary in size and can be used in extremely small roots, and also if it is a painful operation.

DR. SCHREIER. The operation is not painful at all, because the teeth are not sensitive.

A MEMBER. Can you regulate the heat by the strength of the chemical preparation which you use?

DR. SCHREIER. No, not at all. I can only regulate it by taking more or less of the preparation. If you take too much of the preparation it is dangerous, because it might cause an explosion.

DR. CALLAHAM. I have been using this preparation for some time; the heat evolved is perfectly harmless. I have tried several experiments, and have put water in the tooth and used a larger quantity of the preparation to see if it would cause any damage, but I don't think I ever injured a tooth in any way by doing so.

DR. CUSTER. I would like to ask Dr. Schreier what his after-treatment is when he has used this preparation in the pulp-canal?

DR. SCHREIER. I beg you to bear in mind that I do not recommend any further treatment, because every man may proceed with the treatment as he is accustomed to. Some fill the canal with cotton, others with oxyphosphate, while others do not fill it at all. I only wish to give you an account of my process of cleansing the canal.

DR. CUSTER. I don't think you entirely understood my question. I want to know how you wash the canals after using the preparation.

DR. SCHREIER. After using the preparation the canal is filled with a soapy matter as the result of the chemical action. I wash the canals with water, or I prefer to take some weak solution of carbolic acid and water, so as to be sure not to carry into the canal any bacteria. For getting out all the particles of the soapy matter, I wrap a few fibers of cotton around the broach, dampen it with water, and then revolve it rapidly in the canal, because the soapy matter is soluble in water. This procedure will quickly clean the canal.

DR. A. H. BROCKWAY, Brooklyn, N. Y. I have had a little experience with this preparation, and I suppose that experience will be valuable to those who have not used it. Some weeks ago I got the preparation and have used it in quite a number of cases, and I must say I am extremely pleased with the results so far. The question has been asked in regard to the danger of producing too great heat. I have not experienced any trouble from that, but in the first instance of using it I got a little pyrotechnic display by using too great a quantity and inadvertently getting a drop of water on it. It startled me, but the patient did not see it, because his mouth was covered with rubber-dam. The question has been asked in what manner can the soapy contents of the canal be gotten rid of; my method is to use barbed instruments, but I mainly rely upon hot water. Water being a solvent of the soap, the canal is thoroughly cleansed with it.

DR. REESE. I have used the preparation since May in about a dozen cases, and the patient did not know anything about the heat developed by the chemical action. In removing the soapy contents of the canal I have used peroxid of hydrogen; after drying the canal with cotton, put in the treatment with some oil and leave it there for a week, and then I find that the canals have a cleaner feeling than by using any other method,

DR. SCHREIER. It is of course very dangerous if you use too much of the preparation, because it is very explosive.

DR. REID, Chicago, Ill. What is the proportion of sodium and potassium?

DR. SCHREIER. It is not a fixed quantity, but usually I use two parts of sodium and one of potassium, prepared in such a manner that it will adhere to the nerve-broach.

DR. W. B. AMES, Chicago, Ill. I would like to know in what sort of cases this preparation would be used. Would it be used in a case when the pulp had been devitalized a day or two, or when the pulp was devitalized two or three weeks ago?

DR. SCHREIER. I treat it immediately after destroying the pulp if there is insensibility. Any hemorrhage will be stopped by the introduction of the preparation.

DR. AMES. Would this combination of sodium and potassium act the same on the blood as the pulp?

DR. SCHREIER. It would.

DR. AMES. I want to know whether in Dr. Schreier's experience there is much after-inflammation in a few days.

DR. SCHREIER. No. There is no soreness following the application.

DR. AMES. The reason why I ask this question is, I have adopted a treatment somewhat similar to this for treating putrescent pulp-canals with nitrate of silver. In a case where I want to get rid of the pulp-tissue in a canal, after using nitrate of silver I always expect severe inflammation within a few days after the devitalization.

This being a similar process, I want to know in what percentage of cases you have inflammation.

DR. SCHREIER. If a patient presents himself with a sore tooth I proceed in the same manner as I do with the others.

DR. ARNOLD, Columbus, Ohio. Would Dr. Schreier's method of treatment be different from what he has explained if there had been absorption in the apex of the tooth; or if a blind abscess was present, would there be any difference in the process then?

DR. SCHREIER. I don't make any change in the treatment; I always find the fistulous openings closing after three or four days.

DR. FLORESTAN AGUILAR, Cadiz, Spain. I received a sample of it last September. I have used this preparation in all sorts of cases where the pulp had been devitalized for a long time, and also in cases where the pulp has been devitalized only for two or three days; and I have used it in teeth which had abscesses, and my experience has almost always been satisfactory. In very few cases I have met with failure, but I did not blame the preparation; I think everybody has some failures in treating root-canals. I am very much pleased with the result of this preparation of sodium and potassium. I have gone a little further than Dr. Schreier in the employment of this preparation; he says he waits two or three days. I have had as good results by filling the canals immediately after cleaning them. I am always very careful in removing the rubber-dam, because if you let a little drop of the preparation fall on the cheek or gums it is apt to leave a mark on the face, which is very painful to the patient.

DR. H. J. MCKELLOPS, St. Louis, Mo. I am very much interested in this subject. Of course I have been many years in trying to save pulpless teeth. You can get into the posterior root and the buccal root, but when you come to the anterior root what can you do? It is practice that shows me what these things amount to. When I started out to treat pulp-canals, we used creasote, and I have a case of thirty-five years that is standing to-day; that tooth was treated and filled with creasote, and it was cured simply by that treatment. When you insert cotton in the canal with a broach, suppose you break the broach off! You have these things to contend with, and there is not one man in a thousand who can do all he says he can in treating these canals.

DR. H. E. BEACH, Clarksville, Tenn. I want to indorse a feature set forth by the essayist, the necessity for the destruction of all septic matter that is found in the tooth. His method is a good one. We all know that there is nothing that will destroy germs more readily than fire. It seems to me that this method which has been introduced by the essayist is a very easy matter. There are so many solvents of soap, that the best way to get the saponaceous matter out of the canal is to wash the canal out. If there are some particles left in the canal you can burn them up and wash out your canals with alcohol, then dry out the alcohol, and put in your filling with some degree of certainty as to whether or not your tubuli are filled with antiseptic matter.

DR. HINKINS, Chicago, Ill. I want to say a word of caution about this compound. The caution is this, all sodium and potassium compounds are soluble in water. There is no better preparation to clean out this compound than water, as all sodium and potassium compounds are soluble in water.

DR. W. B. AMES, Chicago, Ill., read a paper on oxyphosphate, as follows:

OXYPHOSPHATES.

It is from a physical rather than a chemical standpoint that we can look into the subject of oxyphosphate cements most profitably, for the reason that there is less difference chemically than in their physical characteristics.

The combination of the elements hydrogen, phosphorus, and oxygen, can exist under such an infinite variety of conditions, and be properly termed phosphoric acid, that much might be written of these conditions physical and chemical, ranging from pure ortho-phosphoric to pyro-phosphoric and on to meta-phosphoric, without deriving much more profit than to simply state that in all cements known to me at present, with two exceptions, the acid is intended to be either pure ortho-phosphoric or an ortho-phosphoric acid solution of alkaline phosphates. The two exceptions known to me on the market are Poulson's mineral plombe, and the variety of Harvard cement which is furnished with crystallized acid. In these cements the acids are of the pyro-phosphoric variety. Of these I will have little to say, as trial of these, and extensive endeavors on my own part to utilize pyro-phosphoric acid for the purpose, had led me to consider it impractical and unreliable. An occasional specimen will be all that could be desired, but the impossibility of duplicating it with any degree of exactness precludes any reliance on this variety of acid. I think that the experience of

those who are familiar with these cements will bear me out in this assertion. The conditions under which pyro-phosphoric acid is produced render the obtaining of a definite article extremely difficult, and if this were not the case I am of the opinion that there is no advantage in the use of pyro-phosphoric over the ortho-phosphoric acid.

Meta-phosphoric acid can only be utilized by converting it into ortho-phosphoric by boiling it with an excess of water. Of this large majority of oxyphosphate cement liquids of which I have spoken, viz: those consisting of ortho-phosphoric acid, pure or adulterated, a very few only are unadulterated. In a very large majority of these the working properties of the cement have been modified by making an acid solution of an alkaline phosphate, or by using the glacial meta-phosphoric acid from which to make the ortho-phosphoric. This glacial acid is usually made from sodium phosphate, and retains a considerable quantity of this compound on which depends its glassy nature, pure meta-phosphoric acid being of a softer nature. In either case the result is the same. I propose to claim that any oxyphosphate cement, in which such an adulterated acid is used, is inferior to one in which pure ortho-phosphoric acid is used under proper conditions. My reasons for claiming this are that the adulteration, while it gives some desirable working qualities, detracts from the definite crystallization, and also that it remains in the hardened mass as a soluble material, and by its solution in the fluids of the mouth necessarily renders the cement less permanent. The alkaline phosphates are all soluble in water, and these are the only phosphates which will remain in solution in phosphoric acid for any considerable time. All metallic phosphates in such solution will in time recrystallize partly or wholly, which precludes their use for purpose of modifying the working properties of cements. The object accomplished by the addition of phosphates to phosphoric acid is in cement to retard the setting and render it less caustic.

A reliable oxyphosphate cement is, I consider, necessarily one that is irritating to pulp or rather vital tissue. The cements in which I believe ortho-phosphoric acid unadulterated by alkaline phosphates is used, are Justi's insoluble, Justi's lapidescent, Ames's crystalline, and the Harvard of Richter, of Berlin. I suspect that there are others of the German cements that would come under this class, but I have only been able to test these. I will not enumerate those in which I have found the alkaline adulteration of the acid, but will say that I have gone to some trouble to secure all on the market.

Among cement powders, there is less difference chemically than among the liquids, but physically they differ very radically. The basis of all light-colored cement powders is oxid of zinc. This material can exist under many physical conditions, and yet be simply ZnO . There is the ordinary zinc white, which is amorphous, and does not answer any useful purpose as a cement ingredient until it has been vitrified. After thorough vitrification and subsequent pulverizing, the specific gravity and characteristics have been radically changed. There are various forms of crystalline oxid of zinc produced chemically, but having invariably the same composition. It is my belief that a thoroughly crystalline zinc oxid is much better adapted to the requirements of an ideal oxyphosphate cement than the vitrified amorphous oxid. The crystalline oxid is pleasanter to manipulate, giving freedom from that curdy, clotty condition so objectionable during mixing, and giving a harder, more stable mass after setting. The crystalline oxid is also better adapted to use in connection with straight ortho-phosphoric acid than is the vitrified. So it is in the cements in which this acid is used that we naturally find the best samples of crystalline oxid. The difficulty is apt to be that this crystalline oxid is not in a sufficiently fine state of division, and a cement that is very practical as a filling or pulp-capping material is not at all adapted for crown-setting. It is for this reason that I will tell of my practice of using the liquids and powders of various cements conjointly.

I have found that I can get better results by using a crystalline oxid with many of the adulterated liquids than by using the oxid that is furnished with them. Then with the group of cements in which unadulterated ortho-phosphoric acid is furnished I find that I can use the powders and liquids of all conjointly, getting almost any working quality desired. For instance, the powder of the Harvard is thoroughly crystalline, and of a very fine state of division. With this powder and the liquid of Justi's lapidescent, I have a better cement for crown or inlay setting than by using either of these cements as furnished. This combination can be worked quite stiff, and yet have a smooth plasticity that facilitates the operation, with satisfactory setting qualities. The powder of the lapidescent is less crystalline than that of the Harvard, and the liquid of the Harvard does not give as satisfactory hardening as some of the others of its type. The combination of Harvard liquid and Ames powder gives more satisfactory crystallization than Harvard entire. The Ames liquid and Harvard powder works nicely, does not set as quickly as Ames, but much quicker than Harvard.

The lapidescent liquid and Ames powder makes a good mixture,

setting a little quicker than lapidescent liquid and Harvard powder. For fillings, where great resistance against wear is required, I have nothing at my command in which I have more faith than the Ames crystalline, having a quick and medium slow variety at my command. A more definite crystallization takes place in its hardening than with most other cements. The surface will take on a glassy appearance in the mouth that gives promise of great wearing qualities. It also comes nearer being a submarine or hydraulic cement than those which are termed "hydraulic," and yet are furnished with the caution to have the cavity perfectly dry and keep on the rubber until thoroughly hard. A practical test of the value of cement with me, is to place a bit of partly hardened combination of liquid and powder in my mouth and allow the hardening to proceed while immersed in saliva, using my organs of taste to test it for alkaline adulteration, and my teeth to judge of its hardness. I seldom use cement at my chair without taking notice of its action in this manner. A cement in which the acid contains an alkaline phosphate will have an alkaline taste that will continue to an extent for all time.

Any of these herein mentioned as having ortho-phosphoric acid unadulterated with alkaline phosphate will have a decidedly acid taste for a moment, and then give no sign of solution.

There are other oxyphosphate cements which on account of color cannot be made use of extensively, and need not be mentioned with these zinc oxid cements, on which we will probably continue to place our main reliance.

DISCUSSION.

DR. DARBY. I am surprised that Dr. Ames said so little about the value of Poulson's cement. I have never found anything equal to it. He spoke in the highest terms of Eisfelter's cement, but it is not fit for crown or bridge-setting, it sets too quickly, it cannot be squeezed through a small aperture. Neither of these cements are suitable for crown or bridge setting, but the Ash & Sons' cement are best for that purpose, I would like to ask why Dr. Ames said so little about Eisfelter's and Poulson's cements.

DR. AMES. I said very little for the reason that in my experience Poulson's acid has not been uniform, on account of a crystalline formation. I have always believed that this acid is pyro-phosphoric acid, and it is very difficult to produce that of a uniform character. Poulson puts numbers on his packages, so if there is a complaint of a certain package he can find the package and learn what the complaint is. The reason I did not speak so highly of Poulson's mineral plombe, it is a highly crystalline powder, and

after the powder is pretty thoroughly crystallized it will become sticky and will drag somewhat under the instrument. You can use the powder of the Harvard cements and get more satisfaction than with the other.

DR. BARRIE. I want to know if you use Poulson's cement after it is liquefied or before?

DR. AMES. I did not know of any preparation by Poulson in which the acid is in a liquid form.

DR. McKELLOPS. I am a little astonished that the gentleman who read the paper did not allude to oxyphosphate as a filling-material. I look upon oxyphosphate as a great thing in filling children's teeth or teeth of persons where gold work will not stand. Take a young child, and you can nurse its teeth with oxyphosphates until a time when you can fill with gold, and you will not find any decay where oxyphosphate filling is put in properly.

I can save more teeth in children by the use of oxyphosphates where everything else fails. The fillings wear out, some in one year, some in three or four or five, but they can be replaced. I believe I have one in my mouth that has been there twenty years.

DR. J. ROLLO KNAPP. In the setting of crowns or bridges, we desire a cement that will set rather slowly and will not be hard when crystallized. There are directions accompanying the packages of cement giving a process by which the setting is accomplished slowly; it does not set quite so rapidly when instructions are followed: One instruction is to place ice-water inside of a bottle and then mix the cement on the bottle. I have tried that, and it works satisfactorily.

DR. SMITH, Cincinnati. Dr. Ames refers to the Harvard cement and says it is the best of all. My experience, however, is that it does not quite justify that statement. One quality it has, it sets rather slowly, and when crystallized it presents an ivory-looking surface. Ash & Sons' cement is a good all-around cement for filling and setting crowns. Dr. Flagg's statement that oxyphosphates are wretchedly poor filling-materials is probably true in a great many instances; my advice to new practitioners is not to believe that they will last.

DR. J. TAFT, Cincinnati, O. In using oxyphosphates three or four things must be taken into account. The quality of the material itself is important; another is the manner in which it is manipulated; because in many instances a very good material proves totally insufficient by reason of the defective method of using it.

Another point that must be taken into account is the position where it is to be placed. It is subject to disintegration where it is exposed to two destroying influences; one, mechanical force,

another, the solvent power of the fluids of the mouth. The manipulation of the material on a cold slab is an important point. If the temperature is right, there is no occasion for cooling the slab, but the material should be manipulated correctly. In some cases it should be of greater consistency than others. In crown-work you cannot use the same consistency as in an exposed cavity.

I have sometimes used a little slab of porcelain and cemented it in a cavity of children's and adults' teeth, and it has worn for years. It prevents the wearing of the masticating surfaces of the molars and the cement below will be protected from the solvent fluids of the mouth. I regard it as almost criminal to take a child of ten, twelve, or fourteen years of age, when the teeth are decaying rapidly, and make long, tedious operations in gold when the work will be of a mere temporary character.

DR. AMES. I refrained from speaking about a great number of cements because I couldn't say anything good of them. I would not use Ash & Sons' excelsior, neither would I use the phosphate that is made by Ash & Sons. If I want a quick-setting one, I use one combination; where I want a slow-setting for crown and bridge work, I use another combination. I think you get a better result from Justi's acid than you do in the Harvard; the Harvard powder is the finest that I have used; a powder that is satisfactory for crown or bridge setting is often just as desirable for a filling. I believe if a cavity is properly prepared and dried, there will not be a wasting upon the cervical border.

If you use a bottle of ice-water, be careful not to place your cement ingredients upon it until you are ready to use it; I mix about two-thirds of the cement on a bottle of water which I draw from my hydrant. I would not put my liquid on the mixing-bottle ten or fifteen minutes before I want to use it, for I would expect a condensation of atmospheric moisture that would materially affect the cement. It strikes me as peculiar that in the better cements we find no one manufacturer who has produced an ideal compound. I can get almost an ideal compound by taking the liquid of one cement and the powder of another, and mixing them.

DR. BEACH, Clarkesville, Tenn. I want to state one fact in reference to the mixing of oxyphosphates that has not been referred to. When the weather is warm the powder and the liquid should be of the same temperature, to overcome rapid crystallization of the cement; you can reduce both the liquid and the powder to the temperature of ice-water and then mix it as rapidly, or it can be mixed and adjusted for a filling before it gets too hard without any refer-

ence to the cooling of the glass slab; by cooling the substance itself with crushed ice or ice-water until it gets thoroughly cold.

DR. J. WARD HALL, Shanghai, China. I should like from the far East to sound a warning note, that the verdict should not be altogether arbitrary. The part of the world in which they are used, the temperature and humidity of the atmosphere, should be taken into consideration. It is impossible for a man who lives in the United States to state facts with respect to the various kinds of cements which may be used on the other side of the world, where the wet and dry bulb of the barometer, unlike silver and gold, are not maintained at a parity.

Let us not commit ourselves to the folly of indorsing any one or any number of cements; let us rather recognize the conditions under which they are used; the distinct finalities on which we should settle in respect to cements. I should be very sorry to see the dentists of the world, in convention assembled as we are to-day, pass a general resolution implying any absolute conclusion as to the qualities of cements in general.

A paper by Dr. D. Caracatsanis, of Athens, Greece, was read as follows:

ON THE TREATMENT OF DENTAL CARIES IN THE SECOND, THIRD,
AND FOURTH DEGREES.

After experience in the treatment laid down for the different degrees of dental caries, I have found that the best means to insure a cure of the tooth treated is to make use of temporary fillings. For the last four years I have proceeded in the following manner to my entire satisfaction.

2d Degree. Cavity is cleansed, cauterized with absolute alcohol, and immediately filled. If the dentine is very sensitive, I coat the cavity (after well washing and drying) with a liquid preparation of gutta-percha dissolved in chloroform or oil of cajuput. I then at once fill the cavity with simple gutta-percha, which I leave in place for eight days. If the sensitiveness has disappeared at the end of that time, I put in the permanent filling. If the contrary is the case I remove the gutta-percha and repeat the operation, which procedure may be repeated until the fourth time, for cases with extreme sensibility.

3d Degree. Remove the carious margin, take away the remains of food and softened dentine, carefully wash the cavity with a warm antiseptic solution, and employ the following two preparations: At first, oil of cloves, 3 grams; oil of peppermint, 2 grams; chloroform, 5 grams; acid phenique, 1; collodion, 2; cocain, 1. Second prep-

aration, of metallic cobalt, 5 parts; arsenious acid, 1 part. Saturate a cotton tampon with the first preparation and then with the second, place at the orifice of the pulp without pressure, cover with a dressing of cotton in order to protect the neighboring parts and those cauterized. These dressings will have to be changed several times before the nerve is completely destroyed. Their action is slow, but painless. Then carefully wash the canals. If these are very small, I don't try to open them,—a useless attempt, since it is never possible to do so as far as the apex, and, moreover, there is risk of perforating the root. I rest satisfied, after having assured myself that the tooth has had its sensibility removed under pressure of the bandages. After carefully washing and drying the cavity, I introduce by means of an insufflator some powdered boracic acid. At the end of eight days, if everything goes well, I remove the temporary filling and I fill the opening of the canals as far as possible with liquid gutta-percha and also the nerve-canals. If the canals are large, the liquid may be introduced either by the aid of a tampon or by means of a little syringe. The gutta-percha is covered and also left in its place for eight days. If, during this time, inflammation occurs, I remove the temporary fillings and recommence treatment until the cure is complete.

I never fill a tooth of the third degree even if the canals are widely open, before introducing, after the destruction of the pulp, dressings consisting of aromatic oils. I treated in a pastry-cook, aged forty-five years of age, a large upper molar with closed canals, for one year. On each attempt at temporary filling, a succession of attacks of periostitis arose and inflammations with alveolar fistules. Finally, the tooth was cured permanently, filled, and renders the greatest service in mastication. This man happens to be my neighbor; hence I am perfectly informed as to the results of my treatment. You will deny that everybody has the patience to follow a treatment sufficiently prolonged, and the example which I have cited is an exception; I have also treated a number of teeth in the same condition, but which were cured much more quickly. I always have these persons return for a long time after, to assure myself of the result.

For teeth of the fourth degree, whether with alveolar abscess or not, I employ all the disinfectants and antiseptics. I never give up all hope of filling until a number of fittings for the practice of complete antisepsis. On first filling, in place of boracic acid, I introduce iodoform by means of an insufflator. Temporary fillings are especially valuable in this degree.

Conclusion.—According to my experience and statistics, the fol-

lowing class of cases should never be filled permanently: First, in a tooth of the second degree, the dentine of which is too sensitive, the filling with the chloroform base is the best therapeutic. Second, the best possibility is in retaining the pulp in the teeth of the third degree, and the necessity of putting the teeth to the test of a temporary filling. A tooth of the fourth degree cannot be disinfected and filled at one sitting, and temporary filling is above all indispensable for this degree.

On motion, the meeting here adjourned till to-morrow.

SECTION VII.—PROSTHESIS AND ORTHODONTIA.

The chairman, Dr. C. L. Goddard, called the Section to order at 2.30 P.M.

The discussion of the paper read at the previous meeting by Dr. V. H. Jackson, was reopened.

DR. A. E. MATTESON said he would congratulate the author upon his admirable paper and, though in many respects he would differ with him, he would agree with him in considering piano-wire preferable to any other appliance for the correction of irregularities. There was a difficulty, however, in its use, from its cranky action, for no matter what shape it is bent in, if there is any force to retard its return to its original shape, it will either overcome the force or never cease to try.

He thought that in a number of Dr. Jackson's cases the effect would have been more easily attained by the use of a jackscrew. He thought the jackscrew, in appropriate cases, to be preferred over any other appliance. Had no use for a plate for regulating in any case. Dr. Jackson in his paper says nothing about what he considers the best age in which to begin the process of regulating the teeth. His opinion was that the earlier the better. The deciduous molars are more firmly fixed than any other tooth in the mouth, and they can safely be employed as points of resistance to direct the movement of the erupting anterior teeth if they are out of line, especially as it takes very little force to direct their growth.

In regard to the difficulty of keeping the appliances clean in the mouth, he said that he provided against any serious difficulty by making appliances so that a new wire could be put in, without any trouble or expense of time. He bought gold-plated piano-wire and had arranged a battery so that he could replate it, but still it did in some cases rust. He also plates his German silver appliances with gold.

DR. JACKSON closed the discussion. He said that Dr. Case had said that the action of the screw was more near to the action of

nature than the constant action of a spring. He supposed he referred to the law of nature recognized by gymnasts and athletes, that action succeeded by rest causes increased growth.

In our case increased growth was not the desideratum aimed at. We want absorption, and this is produced by continual pressure. Both experience and theory will uphold the continued action of springs as the best force to move teeth in regulating.

Discussion closed, and Dr. D. Caracatsanis read the following paper :

ON THE POSSIBILITY OF AVOIDING METALLIC CLASPS IN PARTIAL DENTURES OF VULCANITE.

I have frequently read in the dental journals how metallic clasps are destructive of the teeth, but I have never seen the faintest suggestion as to how this untoward result may be prevented or how the plate may be kept in place almost without any clasp. I feel very sure, however, that they may almost always be avoided.

I place a single incisor in the upper jaw with the greatest ease with a plate of small dimensions and without any clasp, by means of white caoutchouc. To insert two teeth, I take advantage of a vacant space produced by removal of a tooth or of a natural space between two teeth for fastening the extremities of the caoutchouc, instead of using clasps. With points of support which have seemed insignificant I have been able to anchor a denture of eight or ten teeth very solidly, the plate being the width of a centimeter or a centimeter and a half at most. There are cases of course in which it is impossible to do without clasps, for example where we have to deal with an incisor of the lower jaw, all the other teeth being in place and in close contact.

I have seen abuses of the clasp method, as for instance of a partial upper denture carrying by means of metal clasps the second right bicuspid, the right lateral incisor, the left central incisor, left cuspid, and the second left bicuspid. At the end of a year the teeth were entirely loosened, the tooth-structure worn away by the friction of the metal, and the patient suffered intense pain in the teeth from changes of temperature. I replaced the piece with one without a clasp, taking care to avoid the slightest pressure on the loosened teeth, and securing the retention of the denture in place solely by rubber clasps affixed as the preceding ones had been to the first molars. The piece kept its place as well as its predecessor, and the plate was no larger. The advantages to be derived from this plan, which concern not only the patient but also the dentist, are economy of material, since metal is avoided; economy of time, and the

facility of making a light plate which causes no inconvenience for the patient.

Dr. Caracatsanis read his paper in French, and Dr. Oliver read the translation.

DISCUSSION.

The fact that Dr. Caracatsanis could not understand English, and very few of those present understood any French, made the discussion very difficult; but the author of the paper said that he would give an opportunity for all to get an understanding to-morrow at the clinic, when he would make a plate such as he had described.

DR. HASKELL said he did not see any objection to clasps either on vulcanite or gold plates; he had always used them, and did not think there was any good objection to them. In preparing a lower denture, if there was a single tooth left, whichever it was, he used it to support the plate, which he banded to it. This will be likely to make the denture useful to the patient, while we all know how difficult it is to get a lower full plate to remain in place while masticating food. Such use can also be made of one or two teeth in the upper jaw, banding on a narrow suction-plate, making what might be called a removable bridge.

DR. OLIVER agreed with Dr. Haskell that a perfectly adjusted gold clasp will do no harm, but it must be properly fitted, like a gold crown, to the tooth.

In cases of lower partial dentures where the plate is held in place by bands or clasps, the friction of the plate and bands moved by the contracted muscles of the cheeks will cause abrasion under the band; and as of course the parts are always moist and the moisture frequently more or less acid, the enamel will be acted upon both chemically and mechanically.

DR. HARCOURT thought it best not to put the band around the tooth too close to the gum-margin, as use would almost invariably force it down closer. He finds gold as thick as twenty gauge to be the best. He makes them fit closely at the four corners, and does not think it best to make it fit very closely in all parts.

DR. W. H. MARSHALL said he would like to give a hint on the subject, as he had had a great deal of experience in making partial plates. In places where he has to supply artificial incisors, where the cuspids are in place he grinds down the cuspid till the sides are parallel, and makes a band to cover the crown to about one-sixteenth of an inch of the gum. The other end of the plate is simply an arm extending to the opposite tooth. The plate is supported on the gum and is perfectly secure, and can be taken out and replaced at

the pleasure of the wearer. At first he had expected that there would be a great deal of wear of the band, but though it is made of No. 30 gold, there is very little wear.

DR. H. P. SMITH asked if he would use such a plate in a case where two laterals and one bicuspid are out.

DR. MARSHALL said he would crown or band the bicuspid, and the little arm would reach to the first tooth left.

DR. V. H. JACKSON said he was much interested in the different methods of anchoring plates, and suggested that a crib wire surrounding a tooth would be, for some reasons, preferable to a band. He referred to a diagram having wires extending around the first molars on each side. He said in cases of lower dentures where there are say two teeth remaining, they are likely to have been moved by the pressure brought on them by the cheeks till they incline considerably to the center of the arch. In such cases bands cannot well be arranged, but wires will easily go to place and serve the desired end.

DR. HASKELL did not think it necessary that a clasp should fit a tooth very perfectly, but thought it very important that attention should be given to the way the clasp is soldered to the plate. The point soldered should not be more than three-sixteenths of an inch, then there would be a constant bending and springing under every strain, and this bending would be at the point of union with the plate. In case the band was soldered, as sometimes happened, half or one-third the way around, the strain caused constant wear and friction on the surface of the tooth. Care should always be taken to insist on cleanliness as near perfect as possible in all artificial dentures and appliances in the mouth. When this is done there is much less liability of decay.

The discussion was closed.

The president called the vice-president to the chair and read the following paper:

SEPARATION OF THE SUPERIOR MAXILLA AT THE SYMPHYSIS.

The upper teeth of a young lady of about fifteen years old presented an irregularity to correct which an appliance was inserted with a jack-screw, for spreading the arch. The nut of the screw was turned twice daily, and the arch spread without pain, till in about three weeks a considerable separation of the teeth was produced.

By measuring from the buccal surfaces of the first bicuspids, it was seen that the arch was spread exactly one-quarter of an inch. The appliance was attached to the first bicuspid and first molar on each side, but does not come in contact with any of the six anterior

teeth. The spreading is not confined to those teeth only to which the appliance is attached, for the central incisors, which previously overlapped, are now separated by a decided space.

Upon making accurate measurements we found that the cuspids had spread apart three thirty-seconds of an inch, and that the centrals, measuring from distal to distal surfaces, have separated at least one-sixteenth of an inch. How can this be accounted for, since the appliance did not touch any teeth anterior to the bicuspid? I can only account for it by the supposition that the two halves of the superior maxilla have separated in the median line. If the casts be examined, a depression will be plainly seen in the gum above the space between the central incisors, while there is no depression in the corresponding position in the first cast.

I formerly believed that a separation would be much more likely to take place in the line of the suture between the intermaxillary bone and the superior maxillary of either side.

The fact that congenital fissure of the hard palate extends from the soft palate in the median line as far as the intermaxillary bone, then deviates to the right or left or follows both directions in the line of the suture between the intermaxillary and superior maxillary bones, would lead us to expect any separation of the superior maxillæ in the same lines. Congenital fissures extending in the median line between the two halves of the premaxilla are extremely rare.

I have found but two cases of forcible separation of the maxillæ in the median line. One related by Dr. W. B. Kingsbury, Santa Clara, Cal., the other case mentioned in the *DENTAL COSMOS*, Vol. I. page 540 (1860), by E. H. Angell, of San Francisco. In Dr. Farrar's book the possibility of such a separation is mentioned, also the fact that it sometimes happens, and plans are given for preventing such an occurrence. No pain or discomfort accompanied or followed the case I have described. I have kept the arch spread, thinking that a deposit of osseous material in the suture would help to retain the exact width of arch that I had gained, and give the room needed for correcting the irregularity of the incisors. The centrals were rotated and the laterals drawn forward till they had assumed their proper positions.

Following the case described, the author gave a detailed description of appliances which he had devised and found useful for spreading the arch. He then called attention to the necessity for a more thorough understanding of "what changes take place in the surrounding tissues when teeth are moved." He regarded the com-

monly accepted explanation that the changes consisted in absorption of tissues in front of the moving teeth and building up behind as not satisfactory, for he had in many cases observed a movement of the alveolar process itself. He admitted that when single teeth are moved along the ridge or outwardly or inwardly there is, without doubt, an absorption in front and building up behind as well as a compression of the cells of the process, but when several teeth are moved in one direction I have no doubt that there is a "bending of the alveolar tissue." Dr. Goddard further called attention to the great importance of proper instruction in orthodontia in our dental schools. It should be taught practically as well as didactically. He then gave a general description of the method of imparting instruction in this branch, which he had found practically successful as the result of eleven years' experience in this branch, concluding with the details of the course in orthodontia as pursued in the University of California, College of Dentistry.

DISCUSSION.

DR. H. R. STALEY said he objected to Dr. Goddard's manner of regulating, because it did not move the tooth bodily but only moved the crown. He thought that the operation should be such that the tooth would be moved roots and all, and not merely tipped in the direction it was desired to take. The bands and other appliances should be such as will hold it firmly, and then its position would be changed without tipping it out of its natural position, and there would be room for the roots as well as the crown of the tooth which was to be forced into the space made.

DR. HARCOURT gave an instance in his practice of the division of the arch at the symphysis. The case was one of a plate that he had made, and after it had been worn some years it was removed from the mouth over night, and when it was placed back in the morning it was found not to fit. When the patient brought it to him he had hunted up the original cast and found that the plate still fitted it exactly, but the shape of the mouth had changed so much in a single night that a new plate had to be made to fit it. He had no doubt that this was a separation at the symphysis such as Dr. Goddard had related.

DR. H. B. SMITH asked if Dr. Harcourt had examined for any disease of the antrum or catarrh in his patient.

DR. HARCOURT said that he had not, and had no knowledge whether any such disease existed at the time or afterward.

DR. SMITH said he had known of cases where such a case of alteration in the shape of the mouth had been caused by trouble in the antrum.

DR. A. E. MATTESON said he had had a case similar to the one described by Dr. Goddard, in which, by inserting a jack-screw between the cuspids, he had in a very short time obtained a separation of fully one-twelfth of an inch between the centrals. This space, upon the removal of the jack-screw, had diminished, and he was convinced that it was caused by traction upon these teeth by the soft tissues, which were stretched by the widening of the arch at the cuspids. He thought that if Dr. Goddard had not prevented it by his regulation appliance, in his case, too, the centrals would return to the position they had occupied.

I think the vitality of more teeth is destroyed by rubber ligatures than by any other means by which we accomplish their regulation; the nerve is killed by the steady tension of the rubber.

DR. E. S. TALBOT said he desired to answer the important question asked by Dr. Goddard as to the opening of the suture. He had frequently done it. If the correction of irregular denture is attempted before the age of twelve or fourteen years, it is very commonly done. In the case of his own daughter the sutures opened about three-sixteenths of an inch, and because it opened I was able to accomplish as much in correcting the arch in two weeks as I had expected to have done in three months. It is an advantage to do it.

He is convinced now that the jaw bends; he did not believe it formerly though. Dr. Farrar says it does, but now he knows that it does. However, in cases where space is gained by the opening of the suture the centrals do move in and fill the space again, but it is because of the force excited by the forward pressure of the other teeth.

His process for moving teeth now is by strips of German silver bent around them in such a way that the one single strip presses the tooth in towards its natural position, and at the same time opens the space for it. Every day he has the patient call at the office, and he shortens the strip, thus increasing its force.

He criticised the methods of Farrar, Angle, and others, who make the posterior teeth points of resistance to carry the anterior teeth back, the probability being always that the posterior tooth would be moved forward.

DR. STALEY asked how long it would be necessary to retain the appliance in shape after the opening of the suture, so as to give the bone time to form before the pressure is allowed to come back on it.

DR. GODDARD said that there was no question that the bone would fill up before it would be possible to gain the space needed between the teeth. He said that he had never devitalized a pulp

that he was aware of except one, and that was a lateral incisor which he had moved one-eighth of an inch three times.

He had never been able to move the roots of teeth to any great extent. Sometimes it would be very desirable to do this, especially when in an incisor where the roots were considerably inside the line, for if the crown should be moved to line the projection would be so disfiguring that he thought it better to extract such a tooth and supply an artificial substitute.

In regard to moving molars forward he had had the same experience as Dr. Talbot, and now I never depend upon it unless I want to move the molar front half-way and the cuspid half-way back to fill a vacant space.

On motion, adjourned till to-morrow.

SECTION VIII.—EDUCATION, LEGISLATION, AND LITERATURE.

Called to order by J. J. R. Patrick, chairman, at 2.30 P.M.

Dr. H. B. Noble, Washington, D. C., read a paper entitled "Dental Legislation."

Dr. G. V. Black, Jacksonville, Ill., read the Report of the Committee on Dental Nomenclature.

REPORT OF THE COMMITTEE ON DENTAL NOMENCLATURE.

BY DR. G. V. BLACK.

The task assigned to this committee to "present a plan by which a universal system of nomenclature may be adopted by the Congress that would be acceptable to the profession of the entire world," is an exceedingly difficult one.

Accepting Webster's definition of the term, our nomenclature consists of the names which we apply to *things* or *ideas*, with their accompanying adjectives or words designating relation or location. A specified form of nomenclature requires an adjustment of phraseology to suit the forms of names used, thus giving an impress to the entire style, and in some degree to the plan of writing. The plans of expression of thought must be adjusted to the nomenclature employed, or the nomenclature must be adjusted to the plans of the expression of thought. It generally happens that in the early growth of any science, the nomenclature is in a great degree adjusted to the modes of expression of the individual writer. It is in this condition that we find dental nomenclature to-day, and it is this tendency to individual characters in writers, often good in itself,

that forms one of the greatest difficulties in the way of the adoption of a definite scheme of nomenclature.

The nomenclature of any science or art is a growth, and it has been necessary to trace the steps of the growth of dental science in order to understand the formation of its nomenclature, and gain a clear conception of its future tendencies. We cannot sit down and construct a nomenclature for dentists any more than we can arbitrarily prescribe the words to be used by any other class of people. Forms of speech are not readily adopted at will, but come to classes of people by processes of growth and education. Hence for a single person or a committee selected from a class of persons, to arbitrarily prescribe the forms of speech for the class, taking their own individuality as their guide, would be wrong in theory and fact, and would only invite failure. The adoption of a definite scheme of nomenclature should be brought about slowly, and after full discussion of the scheme developed by the custom of the best writers in the particular field of science. This scheme may then be improved in the detail of its workings from point to point until finally the individual forms of the words used may be prescribed as is now done in botany, zoology, and other natural sciences.

In dentistry we may be said to have no existing rules except such as may have been developed by the customs of writers; rules not recognized by the writers themselves, unless, indeed, they have undertaken some extended study of forms of nomenclature in general, and the systematization of their own. The effort of systematization seems to have been rare among dentists, and they seem not to have given much study to the general subject of nomenclature. The studies that your reporter has been able to find generally have reference to the adoption of some individual words, or groups of words in a given language. Nowhere in dental literature do we find studies which seem to have direct reference to the systematization of dental nomenclature as a whole.

Your reporter has found no recognized rules of dental nomenclature that will serve as a basis upon which to proceed to the improvement of existing forms. We are therefore without a basis of action until such a scheme is made known and recognized in such a way as to form the basis of discussion.

The necessity for a definite system of nomenclature is becoming more and more apparent to many of the more thoughtful men. Dental literature is being rapidly built up, and within a few more years the more mature thought of the profession will be molding into a more permanent form, or a form from which changes will be much less rapid than they have been in the past. Many have a

desire to see this literature take on a form of nomenclature that will be regular, concise, and homogeneous, uniting all its parts in such a way that the acquisition of its facts will be easy to the student, and so that writers and speakers will be able to present their thought with accuracy and be readily understood by readers and hearers.

A chief difficulty in the outstart of a work of this kind is to fix a standard of beginning. After such a standard has been established and rules have been formed, a revision is much less difficult. Fixing the standard of beginning, or the scheme of nomenclature for dentistry, involves the fixing of a basis list of names to be used in the future, the form and source of which will become the guide for the future formation of names.

The formation of both the scheme and the detail will be a difficult matter, and will require much time for several reasons. The custom followed by the older sciences in the establishment of rules of nomenclature requires that all original workers in the particular field of science be consulted, or at least that each shall have the opportunity to express his views. In our own specialty, your reporter has gathered the names of all who have written journal articles and books in the English, French, German, and Italian languages within the last two and a half years, and finds the number of persons to be 2965. The number of journal articles presented in this time, exclusive of editorials, is 6314. They are distributed as follows :

	Persons.	Journal Articles.	Books.
English language, America, - - -	1152	2623	51
" " England, - - -	519	1116	11
" " Canada, - - -	58	72	c
German language, - - - -	610	1372	58
French language, - - - -	479	1029	39
Italian language, - - - -	47	102	5
Totals,	2965	6314	164

(The names obtained from other countries probably do not properly represent them, and their numbers are not given. It seems that all who have written books appear also in journal articles.)

To undertake to harmonize the views of this large body of workers is a great task, and steps should be taken to bring the matter before them for general discussion, with the view of finally adopting some fixed scheme and rules for the regulation of the selection of technical terms. What is here called the scheme involves the selection of the source of names and their form. In the nomenclature of botany and zoology the scheme requires that names shall have the Latin form,—words from the Latin language, or latinized ver-

anacular words. As time has passed and the use of the Latin tongue has diminished the use of the Latin, case endings have been abridged more and more until now, in the general use of the words, they are practically limited to a single form of termination.

Dr. Black, then, after detailing the history of dental nomenclature as at present existing, suggested the following scheme as a basis for work.

The scheme, as has been said, involves the fixing of a starting point, or the fixing of the forms and the sources of the words to be employed in dental nomenclature. This is embodied in the following:

1. The plan of nomenclature shall be the same in the several languages.

2. Use words derived from the Latin or Greek whenever such words are available, making use of the root and giving it such terminations as may be suited to the language in which it is employed.

Note.—When a word in the Latin or Greek form has come into favorable use in any language, there will be no necessity for changing it to the vernacular form.

3. When, for any purpose, a word from the Latin or Greek is not available, agree upon a word from another language and use in the same way.

4. When it is impracticable to use the same word in the several languages, select a word from each vernacular language. These should be nearly exactly translatable as possible.

5. Adopt such general and specific rules employed in other sciences as may be adapted to dental nomenclature.

Proceeding with the development of his subject, Dr. Black offered the following rules as suggestions:

RULE 1.—Carious cavities shall be designated by the names of the surfaces of the teeth in which they occur.

Note.—These names are: *Labial*, for the incisors and cuspids; *Buccal*, for the bicuspid and molars; *Lingual*, for all of the teeth, discarding the word *palatal*. *Mesial* and *distal* for the proximate surfaces. *Occlusal* for the bicuspid and molars, and *incisal*, for the cutting edges of the incisors and cuspids. (Dr. Andrieu has used the term *cuspidale*, i.e., *disto-cuspidale*, for cavities involving the edge, or cusp, of the cuspids; and also the term *buccal* for all of the teeth, instead of using *labial* for the six anterior teeth.)

RULE 2.—When two surfaces are involved the names of the surfaces are rendered in compound words, giving the preference, first to mesial and distal as the prefixes; and second to occlusal. In

doing this drop the final *al* and add *o* thus: *disto-lingual*, *mesio-occlusal*, *occluso-buccal*, *disto-incisal*, etc.

RULE 3.—When three or more surfaces are involved the names of the individual surfaces are rendered in a compound word, thus: *Mesio-occlusal-distal cavity*. (See exhibit of cavity names.)

RULE 4.—Cavities in the angles of the teeth are designated by the anatomical names of the angles in which they occur, thus: *disto-buccal angle cavity*; *mesio-lingual angle cavity*, etc.

RULE 5.—As a class name mesial and distal cavities are called *proximate cavities*. Thus, *proximate cavities* in the *molars*.

RULE 6.—In describing the superficial extent of cavities use no words indicating direction or position upon the teeth, except the names of the surfaces, the adverbs derived from those names, the divisions of the surfaces into thirds, or the anatomical names of parts or surface markings of the teeth; as the lobes, cusps, angles, grooves, pits, etc.

The report, which was an exhaustive presentation of the subject, entering into a considerable exposition of details, was accompanied by an "Exhibit of the nomenclature of dental anatomy," as compiled from a number of authors in French, German, and American writers, showing the gradual development of terms. It closed with the following recommendation :

These considerations lead your reporter to recommend that a commission be formed to take up this work and complete a basis of beginning, with such rules as their information may suggest as most practicable, and bring this before the whole profession for discussion of all of its features; making the best possible provision for its discussion in all dental journals, societies, and associations. And that they from the information that they may in this way obtain of the wishes of the profession, revise both the basis and the rules, and finally present their report for adoption by such body as may be appointed to receive it.

There was no discussion.

Dr. Garrett Newkirk, Chicago, read a paper entitled "Nomenclature Relating to forms of the Dental Arch and Special Positions of the Teeth." [This paper was illustrated by diagrams, the dental arch being typified by the base and apex of the ellipse, as the egg and the leaf.]

NOMENCLATURE RELATING TO FORMS OF THE DENTAL ARCH AND SPECIAL POSITIONS OF THE TEETH.

It is the purpose of the writer to offer only a few suggestions in this paper. Our knowledge of the facts relating to the subject

as stated has surely outrun our language. We have not arrived at agreement in the use of terms, and may not for some time to come. In matters of description each man is a law unto himself. Each writer who coins a term or makes a definition may contribute something which will bear the test of time and use, and occupy a place in the better vocabulary of the future. I deem it well at the outset to say something of the terms and forms of expression commonly used in attempts to describe the form of the dental arch. (*Arcus dentalis*—"The curved line formed by the teeth," Forbes' Med. Dic.) An arch is said to be large, small, of medium size, or complete, the latter meaning that no teeth have failed to erupt and none have been lost. These terms are reasonably clear and definite. But if we ask for the general form we may be told that it is well rounded, angular, full elliptical, V-shaped, saddle-shaped; all of which terms are indefinite or misleading, if not entirely unscientific. A dental arch cannot be round, neither does it ever describe a segment of the circle. "Angular" means nothing definite, unless we are told the number, location, and forms of the angles. The great majority of the arches are elliptical, but ellipses vary extremely. We have no accepted way of qualifying the term elliptical, and it has the disadvantage of being a word with four syllables.

May we not in this connection borrow a few hints from botanical terms descriptive of the forms of leaves? For example, the word *ovate*, derived from *ova*, the egg. It is represented by the longitudinal section of an egg.

Strange to say, the egg lines, when we come to analyze them, represent two forms of the ellipse combined.

The base of the egg, as we will say, is outlined by the segment of a short ellipse, the apex by the segment of an ellipse nearly twice as long. We have, therefore, in the egg-form term something which would answer to the outline of the dental arch in a very large majority of cases.

We may agree upon the term oval, ovate, or ovoid. The first named would have the advantage of corresponding in termination with some other important term descriptive of teeth, as mesial, distal, lingual, labial, and occlusal. The last word agrees with many of the terminations used in general anatomy, as sphenoid, cuboid, etc.

Dividing the egg-form by a transverse line, we may call the lower segment base-oval (or *bas-oval*), which would represent the broad variety of the elliptical arch. The upper or apex segment, which we may designate by the prefix *ap*, *ap-oval*, would represent the

opposite, or long, elliptical form. To represent a form between these two we might use the term medium oval, or better, *med-oval*.

The term *ap-oval* (or *ap-ovid*) will enable us to easily dispense with certain incorrect and misleading terms. The worst, perhaps, of these is the generally accepted "*V-shaped arch*." This is an absolute misnomer. It is safe to say there never was nor will be such an arch.

In the last edition of our most practical work on orthodontia, to which I shall frequently refer, the V-shaped arch is thus described: "The angular or V-shaped arch is not an uncommon one. In a typical arch of this character, the teeth instead of forming an arch, *are arranged in two straight but convergent lines which meet at an angle* where the central incisors join each other."

There are no straight lines in this arch. Even the incisors, viewed alone, scarcely make an angle. This simply comes closely to the form of a pointed or angular *ap-ovoid* arch. It has almost the typical small end of the egg shape, and no one ever accused an egg of having straight lines and acute angles.

If a special name be called for (which is doubtful) to designate the arch wherein the mesial surface of the central incisors are unrelated as to suggest a positive angle, the word *conoid* (see Webster) would be exactly suitable—two curved lines more or less diverging from the point where they meet.

"*Saddle-Arch*." Another term which should be at once discarded. There never was a "saddle-shaped" arch which would have served as a model for the saddle of any horse or donkey that ever lived. The arch so called is simply a *constricted ovoid*. The word constricted means drawn together, cramped, compressed. It is used in vegetable and animal anatomy to represent the narrowing of a body at a given point or line. In surgery the relative term *stricture* is employed to designate the partial closure of a canal or orifice. A displacement lingually of the bicuspid teeth on both sides, which may include the first molars, with their portions of the alveolar process, forms a true constriction, and we need no other term than constricted, or a relative term, to represent it.

It will be seen that there is a marked difference between the terms constricted and contracted. One applies to a limited region or line of the object spoken of, the other to its being made smaller as a whole. We *constrict* a wet sponge with a ligature; drying will contract it. Strictly speaking, also, any body said to be contracted must have been larger, and the word would rightly apply to the dental arch only in cases where teeth having been lost by extraction or decay, those remaining have moved together, lingually, with an

actual shortening of the alveolar processes. The expression "contracted arch," notwithstanding, is often employed to describe a condition where contraction has never taken place, and what the writer or speaker has really in mind is smallness or non-development.

The Truncate-Truncal-Truncoid or Bi-angular Arch.—For a descriptive term applying where the line of the incisors is nearly straight from cuspid to cuspid, forming very nearly two obtuse angles, the term *truncate* has been suggested. This term is also used in botany as well as in physics.

If we adopt the egg-form idea in the matter recommended, it would be well, I think, to have the terminal syllables agree; *i.e.*, if *oval*, then *truncal*; if ovoid, *truncoid*; ovate, *truncate*. Where all the teeth except the incisors follow the oval curve, as they frequently do in the truncal form, I can see no objection to the compound *trunc-oval* (or *trunc-ovoid*).

If the word *angle* is to be used at all in describing dental arches I can see no objection to the term *bi-angular*, as applied to the truncal where the line of the bicuspid and molars is nearly straight, so that the cuspids represent, practically, two obtuse angles.

There is a form of arch occasionally seen—an exaggeration we may say of the truncal, where the usual position of the central incisors is in a manner reversed, *i.e.*, their mesial surfaces look lingually instead of labially—the labial surfaces of the teeth presenting toward each other, producing a slight frontal indentation of the line of the arch.

For this form also the botanists have given a name beautifully adapted to our need. It is the term *retuse*.

This peculiarity is often found in the broad oval form of arch, and the compound term, *bas-oval retuse*, would, as it appears to me, be accurately descriptive. Where oval lines are not pronounced, but angularity prominent, the term *trunco-retuse* would suggest the form.

We have the term "crowded" to express the condition where by reason of insufficient room the teeth have not been able to assume exactly their normal positions. The deviations may be slight, or amount to a considerable irregularity. Some of the teeth may have been forced labially, others lingually, from the true line of the arch, usually with more or less *tort*.

But we have occasionally a condition the opposite of this, where there has been apparently an over-development of the alveolus; at any rate, between teeth there are free spaces, sometimes wide separations. If any name has been given to this condition, I am una-

ware of the fact, and therefore excusable, I trust, for suggesting the term *separal*.

Example of application: There was a large bas-oval, semi-truncal, separal arch.

Special Positions of the Teeth.—In the recent work on orthodontia before referred to, occurs this sentence: "When the permanent lower incisors erupt, they make their appearance inside of the deciduous ones, which soon loosen and drop out." Now, the author does not really mean that the larger teeth can occupy positions inside the smaller ones; he means that the permanent incisors appear *lingually* from the deciduous incisors. Their position is *lingual* to the line of the temporary arch.

In the same work the subjects of several chapters are stated as follows: "*Incisor teeth erupting outside or inside of the arch.*" "Cuspid teeth situated outside or inside of the arch." "Incisor teeth situated outside or inside of the arch after dentition is complete."

The author would hardly insist, I think, that the incisors and cuspids did not constitute parts of the arches in the mouths wherein they were found. But a body which is either outside or inside of an arch cannot be a part of it. In a case where the other teeth were all in approximal contact, and the misplaced tooth or teeth not in contact with others, the terms might apply, but such a state of things rarely exists. As I understand, the author is describing a form of irregularity *in* or *of* the dental arch. He means that certain teeth have erupted, or are situated labially or lingually from the true line of the arch. There is a condition of labial or lingual displacement.

When we speak of any dental arch we must include all the teeth, certainly all that are in contact. But what are we to say? Authors are excusable for many faulty expressions, for we have no agreement in the profession as to fit terms. Shall we say, "Cuspids labially (or lingually) misplaced?" These are better, I think, than the terms "outside of" or "inside of," yet a little clumsy.

The author quoted has a chapter devoted to "the reduction of elongation of the anterior teeth," referring to teeth which have *extruded*(?) This is a misnomer also. We know they are no longer than before, and yet we must persist in using this term and its companion, "elongated."

Again, what term have we to describe the opposite condition, where a tooth falls short of the occlusal line of its neighbors? We call the tooth "short" when it is of equal length with its fellow of the opposite side, whereas the question is not one of length but of position.

We have used the term "protrusion" indiscriminately, as describing either the thrusting forward of a tooth or its extension beyond the occlusal line. Its use should be limited to the first named; in accordance with its true etymology *protruded* represents the condition of having been put forward, or onward. By this limitation *protrusion* would stand for labial displacement. We would say then, for example, "Early loss of the deciduous cuspid had caused complete (or partial) closure of space, and *protrusion* of its successor;" or, "There was a *protruded* left lateral incisor." The terms *extrude*, *extrusion*, *extruded*, would apply perfectly to cases of apparent lengthening, where teeth have moved partially out of their sockets longitudinally.

Now, if these terms are allowed, we may go farther and use the words *intruded*, *intrusive*, *intrusal*, in precisely the same manner, as applying to the lingual displacements.

But we need yet one more term to describe the position of the tooth which seems shorter than its neighbors, and in the older dictionaries we discover the word *subtrude*, a something thrust under. We may imagine that a wedge between the occlusal surfaces has driven the tooth in an apical direction. It is *subtruded*. Its position is *subtrusal*.

So we have a set of four words with uniform terminations.

1. *Protrusal*: A position forward; labial.
2. *Intrusal*: A position backward or inward; lingual.
3. *Extrusal*: Position beyond the occlusal line (as if lengthened).
4. *Subtrusal*: Position short of the occlusal line (as if shortened).

If we observe, as we may often, that a tooth has been both protruded and extruded, we may describe its position accurately by the compound term *ex-protrusal*; or if forward, mesio-protrusal. Of intruded teeth we would say disto-intrusal, mesio-intrusal, etc.

Tort—Twist—Rotary Displacement. In the work before referred to, the following definitions are given: "The term torsion, as applied to the teeth, signifies that condition in which a tooth is found to be turned upon its axis. Rotation refers to the act of twisting or turning a tooth so as to bring it into normal position. Torsion, therefore, describes the condition, and rotation the operation."

I question the accuracy of these definitions. I have not been able to find a dictionary in which the word torsion is made to stand for the state or condition of any body which has been twisted. Webster says, defining torsion,—“From Lat. *torquere*, *torsi*, *tortun*, to

twist." The term applies strictly to the *act* of turning or returning, *and not to the position of* the thing acted upon. In the case of a tooth, the word torsion would apply to the active process or movement originally toward the malposition, or to the disposition and power of returning to a twisted position after treatment, but we cannot make it descriptive of a condition or state, unless we give an entirely new meaning to the word. The words *tort* and *tortile*, however, do apply to a state or condition of the thing spoken of. *Tort*, in law, is a name for a wrong and injury,—a condition twisted, not right on legal lines. *Tortile* means "twisted, wreathed, coiled." These terms apply to things, conditions, states, brought about *by* torsion.

I doubt that we have the right to use the word torsion to accord with the definition quoted. But there is no doubt *tort* would be a noun standing strictly for the condition of the tooth spoken of. Tortile (or tortal) would be the adjective applied to either tooth or position; as for example, "The tooth has a mesio-labial tort." "There was *tort* of the left lateral incisor mesio-lingually." To borrow the language of the author quoted, tort would signify "that condition in which a tooth is found to be turned upon its axis." But we would say of the tooth, "It was tortal, or it had a tortal position." (We might add, mesio-labial 45 degrees, signifying that the mesio-surface of the tooth was turned labially one-eighth of a complete revolution.)

In a condition of *tort*, the relations of *all* the surfaces of a tooth are wrong. For example, if there be labio-distal twist, the distal surface presents semi-lingually, the lingual semi-mesially, the mesial semi-labially. Therefore, we may greatly simplify description by agreeing on certain surfaces as starting points. I will suggest that we make them the mesial and distal. If we say, for example, mesio-lingual, or disto-labial tort, giving the number of degrees, the position of every surface may be at once understood; for all must have moved in the same direction, in the same ratio of distance, as the *result* of torsion.

When we undertake to correct the position of a tooth in tort, *the force we exercise is torsion*, and the term would be a good one. But we have adopted pretty generally the word rotation, which in its original meaning applied only to the action of the body undergoing movements around a given center. For example, we would say, "the rotation of the earth, or of a wheel," not referring to the power that moved the earth or the hand that turned the wheel. But recently it has been deemed allowable to say we rotate crops, or men in office (which is incorrect, for we do not turn them round and

round); and now we have got so far in our philological rotation that we rotate teeth.

Inclination—Inclined. Here are words which we have not used as often and as systematically as we ought, to signify the *leaning* position of a tooth or of teeth. I wish merely to suggest that we use the terms *inclined* and *inclination* in a methodical way, as for example, "the second inferior left bicuspid inclined disto-labially," "the right inferior second molar had a considerable inclination (or an inclination of — degrees) mesio-lingually." These forms instead of the common expressions, leaned, tipped, tipping, tipped in, tipped forward, etc.

DISCUSSION.

DR. PATRICK called Dr. Newkirk to the chair and said: This is a question that will never be settled. Like the harp of a thousand strings, the more it is played on the better music you get. The discussion of this question gives us good practice. We cannot fail to learn something when such questions are discussed. It is an admitted fact that certain races of men have, in the majority of cases, a special type of arch. The term *constricted arch* is a very proper term, and is applied in surgery to any portion of the body where collapse is possible, as the intestines, throat, air-passages. Gothic arch is a correct term for the arch which comes to a point, an apex. This term covers the whole field. The arch is not constricted, but may be regular in its irregularity, both sides being alike but coming to a point. I have never seen an arch deserving the term truncal (as per diagram). It must be borne in mind that the teeth are individual organs, any one being liable to be very much larger or smaller than all the others; they are liable to be giants or dwarfs. A tooth *extrusal* is gigantic. *Anteversion* is a most proper term, but it is not prognathism—the latter is never seen in the deciduous teeth—the infant African is as flat-faced as the European baby. Anteversion expresses a projection of the teeth independently of the jaw itself. Retroversion of course expresses the reverse. We may have *reversion* to right or left, external or internal.

Torsion is generally used to correct the position of a tooth abnormally rotated, and implies corrective force. The tooth is rotated on its axis to many degrees anterior or posterior. These few terms occur to me at this time as being in general use, while those suggested require study and explanation.

DR. J. Y. CRAWFORD wished to ask Dr. Newkirk how he would describe a tooth which he calls *intrusal* (as per diagram) but returned half-way round on its axis.

DR. NEWKIRK thought it might be called "complete tort" or "intrusal 180 degrees."

DR. C. R. TAYLOR said that the use of words could not be settled even by a Dental Congress. It is necessarily a thing of gradual growth. When we have perfect writers we will have more perfect terms. We can only adopt the terms we find to be used by the best authors. A committee of the World's Dental Congress, men of great linguistic powers, should submit certain words to the profession for general adoption, to be criticised or recommended in each branch or subject.

DR. J. Y. CRAWFORD said that he made no claim to being a scholar, a scientist, or a philologist, but he thought that scientific truths were entitled to a safe depository, to a place of safe-keeping. This discussion offers the strongest argument in favor of higher education, linguistic education for the dental profession. Truth can find its safest lodgement in a so-called *dead language*—one which is not subject to change and innovation. This argument is relied on by the (numerically) strongest religious denomination. The process of evolution changes and vitiates language. It is extremely unfortunate that we cannot agree on fixed terms to indicate certain things, so that each one could understand all the others clearly. In some of our best writings I have to labor to understand the style of expression as much as the thoughts themselves.

DR. NOVES. Contracted is not a proper term to use for a thing that has never been any larger, and constricted seems to me open to the same objection. We use these terms for comparison with the standard of normal development.

DR. NEWKIRK. I have purposed to present simply what has occurred to me, after as close analysis as I have been capable of making. Constriction is due to the exertion of extraneous force. A small arch is simply undeveloped.

DR. BLACK here read portions of the second part of his paper, which was illustrated by tabulated statements of great value for the student. He said, in reply to Dr. Crawford's remark, that the proper safe deposit vault is an accurately defined nomenclature, whether in Latin or in the Congo language matters not, so that it is written and accurately defined. The question will be ultimately settled by the scientific "survival of the fittest."

DR. PATRICK referred to the omission of all names for margins—there can be no surface without a margin, and these should be distinctively named.

DR. BLACK said that this was done, both in the unread portions of this paper, and in his work on the "Anatomy of the Tooth."

DR. CRAWFORD wished to ask as to the propriety of the use of the word *clinician* to express a person appointed to give clinical instruction, the word more properly referring to the services of the physician at the bedside.

DR. BLACK said that a *technical term* is properly a word used out of its ordinary dictionary sense and which requires an explanation. Such words are necessary, and grammarians must correct their grammar to agree with good usage. Hence *clinician* is a good word, and supplies a deficiency, not supplanting another equally good or better known.

We may fix nomenclature till we are gray, and until the next generation grows gray, but there is no fixity while science is progressive.

Adjourned to 2.30 P. M. Thursday.

CLINICS AND DEMONSTRATIONS.

The attendance at the clinics this morning was good, but apparently most came to see others operate, rather than to operate themselves. Many patients were on hand to fill appointments, but the operators failed to call for them.

Dr. V. H. Jackson showed a large number of casts, fitted with regulating appliances, as we described in his paper read yesterday before Section VII.

Dr. C. W. Jones exhibited a root-trimmer and facer for trimming the cervices of roots above the gum margin without lacerating the gum, for the reception of a collar or crown.

Dr. Thos. Fillebrown demonstrated the method of sustaining ether-anesthesia by the use of blow-pipe and foot-bellows. The claim is made that anesthesia may be thus kept up for a long time without unpleasant or injurious effect upon the patient.

Dr. Geo. B. Clement showed a series of slides under the microscope which he claims prove that pyorrhea alveolaris is caused by the calcic infiltration of the cementum, producing calcic hypostasis. His theory is that the cementum while it receives just so much nourishment as will allow it to retain its natural condition, will be healthy, but in case of supernutrition a condition of inflammation will occur, while in the opposite condition the microscopical vessels of nutrition in the cementum become obliterated by the deposition of lime-salts, and the disease pyorrhea alveolaris is the result. His specimens showed sections of cementum from healthy and diseased teeth, and seemed to prove the truth of the theory.

Dr. Geo. D. Sitherwood exhibited a cabinet for the conven-

ient keeping of tools needed in crown and bridge-work in the dental office. He also showed specimens of aluminum dental plates.

Dr. W. H. Marshall inserted an amalgam filling.

Dr. Marshall gave his clinic to call the attention of the dentists to the fact that amalgam or alloy will save teeth as well as any other material; and he claims that as saving teeth is the object of dentistry, that he who saves them should be remunerated in proportion to the value of his services.

His manner of inserting the amalgam is by the means of very small burnishers and a matrix.

Dr. B. C. Russell inserted a porcelain inlay in a left central incisor. He took the usual course in such cases, of first cutting the cavity of decay out with a circular instrument and grinding a porcelain inlay point down to fill the circular hole thus formed, and carefully adapting the piece to the surface after it was cemented in place. A remarkable feature of this case was that the patient had a similar inlay in the right central, which he had worn for over eight years.

Dr. W. H. Richards demonstrated his method of filling tortuous root-canals at the apical foramen with metallic fiber. He having cleaned out the root-canal as well as possible, moistens a broach with oil of cassia and passes it into the canal to moisten the walls, then with the broach moistened he touches it to the metallic fiber, which adheres to it. Now inserting the broach with the adhering particles of the fiber into the canal, he manipulates it so as to work the fibers down into the canal, the sense of touch assisting him in determining when the apical foramen is reached.

Dr. Schreier exhibited and explained his method of treating putrescent pulps with natrium-kalium. He asserts that by his treatment a dead and putrescent pulp may be removed and the tooth filled at one sitting with absolute safety. The action of the preparation being to change all putrescent material to an aseptic soapy mass.

Dr. W. G. A. Bonwill filled a left lower first molar with amalgam. The whole crown of the tooth was decayed, but the pulp still living in the root. Having excavated the cavity out, he made retaining-points to hold the filling, and clamped to the sides of the tooth pieces of vulcanite to support the filling while it was being inserted. As each piece of amalgam was inserted, the excess of mercury was squeezed out of it by pressing it tightly to place with an instrument, the point of which carried a pellet of bibulous paper.

Dr. Bonwill claims that such a filling is as useful or more useful than a gold filling would be in the same tooth; that it will last longer, while it is not so expensive to the patient nor so exhaustive to the dentist.

FOURTH DAY—GENERAL SESSION.

Meeting called to order by Dr. Shepard.

Dr. Walker, chairman of the Executive Committee, then introduced Dr. G. C. Daboll, of Paris, France, who was welcomed by the president as a special guest, representative of American dentists practicing in Europe.

DR. DABOLL briefly expressed his appreciation of the reception accorded him.

The report of the committee to promote the appointment of dental surgeons in the armies and navies of the world was read by the secretary-general.

MR. PRESIDENT AND GENTLEMEN:

The Committee to promote the appointment of Dental Surgeons in the Armies and Navies of the World beg to report:

That opposition to such appointments came from the surgeons in the army and navy of the United States. The proposition to give the dental surgeon an equal grade with the surgeon was strongly opposed.

It was deemed the better course not to be too urgent at this time, but to send every year a copy of this request to the surgeon-general, to remind him that the effort to place the dental surgeon on an equal grade with the surgeon had not been abandoned.

Respectfully,

M. W. FOSTER, *Chairman.*

DR. WALKER then presented the official documents sent by the representation of Denmark. The first document was a testimonial from the Copenhagen Dental College as follows:

COPENHAGEN DENTAL SOCIETY.

TO THE WORLD'S COLUMBIAN DENTAL CONGRESS,

Chicago.

Authorizing Dr. J. L. Secher, dentist of Copenhagen, to represent at the Congress the above named; the Dental Association of Denmark gives its compliments to the Congress and expresses its distinguished, high esteem for the American Dental Corporation; gratefully remembering its energy and intelligence equally impressed on every domain of dental science.

By the President,

ERNST WARMING.

(Seal of Society.)

The second testimonial was presented in the form of beautifully illuminated Old English text, and the translation could not be made at this time. It was signed by the officials of the Copenhagen Dental Society.

A paper was then read, entitled "Among the Ancient Hawaiians," by J. M. Whitney, of Honolulu, H. I.

AMONG THE ANCIENT HAWAIIANS.

To the thoughtful and conscientious dental student and practitioner there must constantly arise questions to which he may look in vain for satisfactory answers in his common surroundings. He sees the ravages of dental caries and other diseases so almost universal in our day, and he asks, Is this a necessary evil to which all mankind is subject? or is it a result of the artificial life and varied foods to which our modern civilization binds us? Is dental irregularity due, as some claim, to the mixture of races, and if we could find a people homogeneous and simple, would these conditions exist? Is it true that as mankind advances in the stage of being, the third molar is to become gradually eliminated? What is the normal position of adjacent teeth in relation to each other? What relation has the kind of food we use to the building up of dental structure?

We all know the difficulty, amid the complications of modern hygienic conditions, of answering these important questions to our own satisfaction. But if we can examine the dental organs of a simple and isolated people, not affected by the vices and diseases, which are surely not necessarily a contingent of civilization, but which are sure to follow in its train, we may draw some conclusions which will throw much light on our problems. It would be difficult indeed for most of us to find living subjects in any number, meeting these conditions. But fortunately the bony structures are preserved long after the owners of them have passed beyond mortal ken, and if we can obtain the crania especially of people who, living upon the earth ages ago when wants were few and means of supplying them were correspondingly limited, our study of their dental conditions will certainly be interesting and ought to be instructive.

I consider myself especially fortunate in living in a land where both of these requirements are met; first, the native Hawaiian people, until within a hundred years, lived isolated and unknown to the great world, therefore their habits were simple and their wants and opportunities were few; **second**, their modes of burial were such that it is possible with comparative ease to obtain some knowledge of their primitive conditions.

"The most isolated place on the globe," that is what Prof. Alexander, the learned historian and ethnologist, says of the Hawaiian Islands. Two thousand miles from the Pacific coast of America, and equally distant from the Micronesian, Samoan, and

Tahitian groups; the nearest inhabited islands, and more than twice as far from the east coast of China and Australia, they occupy a unique position on the map of the world.

About the year 500 of the Christian era, a boat-load of men and women drifted to these shores, either from the Malay Archipelago or from one of the southern islands which had previously been settled by Malays. Except a short period of intercourse between the Pacific Islands in the eleventh and twelfth centuries, these islands were scarcely known to the world until their discovery by Capt. Cook about a hundred years ago. Even the slight intercourse that may have existed during these twelve centuries must have been among kindred races on the Tahitian and Marquesan Islands, so that practically this people (until within a hundred years) had not changed their race, characteristics, nor their habits of life during the 1200 years of their existence. Fortunately, enough of their history and customs have been preserved to give us a good idea of many of their characteristics, their food, etc. They were of medium height, rarely reaching six feet, with heavy strong bones, their crania large and thick. Their employments were tilling the soil, fishing, and war-rig. Their games were hurling the spear, riding the surf-board, boxing, wrestling, and other exercises requiring great bodily strength and courage.

The climate at the seashore averages 75 degrees, with slight variation from day to day, and not varying more than 30 degrees during the year, while as one ascends the lofty mountains with which the country abounds any climate may be found to one of perpetual snow. Thus excessive heat is never found, and vigor of body can be maintained. In the former days of which we have been speaking such diseases as typhus, typhoid, malarial and scarlet fevers, whooping-cough, measles, mumps, smallpox, syphilis, and leprosy were unknown. Diseases of the alimentary canal and of the lungs were the most prevalent troubles.

Their animal food consisted mainly of fish, with which the sea abounds. Domestic fowls were common, with dogs and swine, both of which were choice articles of food. Of vegetable foods the principal then as now was the *taro* (*Colocasia antiquorum*), which is the Hawaiian "staff of life." From it is made the *poi*, an acid paste without which a meal is never quite satisfying. They also had yams, sweet-potatoes, and sugar-cane. Their common fruits were coconuts, bananas, bread-fruit (when cooked resembling sweet-potato), and *ohia* or mountain apple. Their habits of eating were most irregular, often neglecting to supply themselves with food for several days, and then gorging themselves at any hour of the day or night.

With the incoming of civilization of course many of these conditions have changed. Though *poi* and fish are still the favorite articles of food of the native people, they have added to these many acid and sub-acid vegetables and fruits, with meat, fine flour, etc.

The second peculiarity of this people rendering a knowledge of their early physical conditions possible, is their modes of burying their dead. The most ancient and favorite of these places of interment were in the old lava caves, with which the island of Hawaii particularly abounds. A lava stream flowing from some opening on the mountain side would cool first on the surface, leaving the still flowing lava within to empty itself on the country below, and thus a long irregular cave of varying dimensions would be formed. Many of these open from mountain-sides, and often from apparently inaccessible precipices. The ancient Hawaiians were very superstitious; the ghost of the dead was supposed to haunt the body long after death, and the friends of the dead anxiously sought the most remote and inaccessible places for depositing their bodies. The islands were teeming with people, and some of these caves are piled many feet deep with the bones of the ancient dead. No wind nor moisture ever reaches them, and the bones are as perfectly preserved as in our most carefully kept cabinets, after probably hundreds of years since their interment. But the natives even now guard the burying-places of their ancestors with most jealous care, and it is not easy even to one familiar with them and their language to obtain access to these ancient sepulchers.

The other mode of burial to which I referred, and which I consider to be much more recent than that of the caves, was in the sand of the sea-shore. Until within a comparatively few years, specimens of crania and other bones from these burying-grounds could be obtained readily in many places. Six or eight miles from Honolulu there was such a place twenty years ago, where for several miles on the sea-shore these human remains lay bleaching in hundreds under the tropical sun, until they had attained the color and texture of ivory. I have seen several similar places on the island of *Oahu* and on *Kauai* particularly, but they have ceased to exist. In some places the grass has grown completely over the sand-mounds, and cattle pasture over whatever bones may remain buried beneath. In others the native people, jealous of their removal, have taken care to break and demolish the skulls, thus rendering them useless. And the South Sea Island laborers have sought everywhere for the skulls and removed the teeth for the purpose of making necklaces of them, of which they are very fond.

Realizing more the value of these ancient remains now that they are so difficult to obtain, I recently spent a week on a journey to the island of Hawaii for the purpose of visiting some of these lava caves and securing if possible some of their treasures. I was fortunate in being able to obtain the assistance of a friend whose knowledge of the native people and their language made him especially valuable, and I may say indispensable to my success. A voyage of perhaps two hundred miles from Honolulu brought us to the vicinity of the caves. Providing ourselves with candles, stout cord, etc., we at once engaged the service of an old native who claimed to know all about the object of our search, and spent the first day in a vain endeavor to find the ancient cave. Whether the native knew less than he had professed, or whether at the last his courage failed, and he feared the result of guiding us aright, we did not know, but we suspected the latter reason was the true one.

The next day we secured two guides, and after riding many miles over rough lava-covered land, we reached a spot, which our guides pointed to us as the entrance to a burial-cave. It was near the sea-shore, far from any human dwelling, and from any place that could support a habitation. We could not believe at first that an opening could exist there large enough to admit a man's body, but with much labor we succeeded in removing the rocks so that by considerable effort we were able to force ourselves through. Leaving our unwilling guides at the entrance, we fastened a cord securely to the opening of the cave, lighted our candles, and proceeded to work our way down. Descending among the rocks until we were at least fifty feet below the surface, we suddenly entered a large room, perhaps forty feet high. There were no bodies here, but opening from this room on several sides there were low, narrow passages. Entering one of these, we followed it for perhaps a quarter of a mile. Part of the way we were obliged to crawl with great difficulty through the narrow tunnel. We were finally rewarded by again suddenly finding ourselves in a large room, and surrounded on every side by the objects of our search. Near the entrance some of the bodies lay as if hastily deposited, but most of them were laid away with care, some upon shelves partly made with sticks laid in the rock at the side of the cave, more in an opening at the side, which the remains of a stone wall showed to have been at some time walled off from the rest of the cave, while the dim light of our candles showed us several openings in different directions which doubtless led to other similar burial caves.

The knees were usually drawn up to the breast, tied with a cord, and the whole wrapped in many folds of the native cloth or

tapa. By the side of each had apparently been left some food, and perhaps his fish-hook or spear, that he might not want for food in his future home. The air being very dry, and perhaps having some antiseptic property, many of the bodies were completely mummified. Deep dust lay upon everything, and the stillness of death was over all. We could easily imagine with what awe the friends of those lying here had crept down at night and laid away their dead. For the greatest secrecy must be observed, so that no one could ever find them. "I do not wish," said a dying chief, "that my bones should be made into arrows to shoot mice with, or into fish-hooks."

We secured as many specimens of crania only as we were able to carry, packing them in bags. It was growing dark when we emerged from the cave, and when our natives who were waiting outside saw our bags of bones and realized that they must help us to carry them home, they were in utter consternation. It was with difficulty that they could be persuaded to place them upon their horses, and then regardless of us, of road or path, they took the shortest way home as fast as their horses could carry them, not daring to look behind, lest they should see the pursuing ghosts of their ancestors; leaving us to pick our way as best we could over the rocks in the dark, without even a path, the eight or ten miles to our lodging-place.

We have been taught that primitive peoples, living in simple conditions, were in a great measure free from dental caries as we see it in the mouth of our patients, and that many of the forms of dental disease with which we have to contend were with them wholly unknown. This seems to me a mistaken teaching, as far as may be learned from these records. An exceptional opportunity of becoming acquainted with the crania of the ancient people of these islands during the twenty-four years of my residence here has convinced me that both in the case of those buried in the caves, and of those more recent in the sand, not more than twenty-five per cent. have been free from caries, irregularity, or disease. Indeed, I think I have discovered every form of dental disease known to our practice; dental caries in all its many types, necrosis of the teeth, erosion, alveolar abscess, pyorrhea alveolaris, disease of the antrum of Highmore, necrosis of the maxillary, ankylosis of the jaw, salivary calculus, etc.

Here was a well-developed osseous system; the individual was trained to exercise of the kind that would develop every part of the structure. Living upon an abundance of the simplest yet the most nutritious and bone-developing foods that would not cling to the

teeth, but would exercise and clean them, with not an element lacking required by our present knowledge, and yet the same dental disease which we suffer burdened the lives of the ancient Hawaiians.

While this is true, I have been interested to find that the teeth of those who died before civilization had introduced to the people peculiar constitutional diseases, acid fruits and vegetables, fine flour, and varied foods, were much less seriously attacked by disease than afterwards. As a general statement the teeth would be found clean, and when caries existed it was here and there in teeth of both maxillaries and on both sides, but not so pervading as found in the more recent crania, or in the mouths especially of the young of the present time.

We have often accounted for the irregularity of teeth found so commonly among Americans, by the mixture of races of which our nation is composed. We say that the wide teeth of the large jaw of one race, being crowded into the narrow jaw of another race with which it has mingled, would of necessity produce an irregular arch. But here is a people, isolated from all others for at least fourteen hundred years, with no admixture of races; yet irregularity of the teeth of both maxillaries was almost as common as it is among the mixed races of to-day. It would be difficult to give a good reason why a fixed type for the mouth of this people should not have existed a thousand years ago, and that all with rare exceptions should have been modeled from it, had Nature designed that there should be absolute uniformity in her work.

Among the crania I have examined I have noticed what seemed to be somewhat fixed as a type, that the teeth are set closely together and well rounded, and that the dense part of the enamel, near the cutting-edge or grinding-surface, strikes its fellow at that point, the whole being held firmly together by the buttressed third molar.

Perhaps next to dental caries, the greatest source of oral disorders among these people was the irregularity of the third molar, often producing in them as serious consequences as with us of the present time; while its failure to erupt was nearly or quite as common as we find it in our daily practice. So that we cannot argue from these remains, at least, that the coming man is to be deprived of this useful organ.

The relation of food and disease to the health of the dental organs is strongly brought out as we study the changes shown in the teeth of those buried in the oldest caves, and so down through the more recent burials in the sand; then of those who were the old people a quarter of a century ago, whose childhood was passed be-

fore civilization had touched their life-habits; and their grandchildren who are now in our schools. These children, as shown by actual examination, have but little better teeth than their white school-fellows. Their fathers and mothers may have better teeth than the children, but it would be an exception if they had not been to the government physician and had one or more teeth removed for relief from odontalgia, while the grandparents, the old men and women whom I found when I first went to the islands, had teeth approximating those found in the old caves, though not as good.

I lay much of this very great change to the many forms of disease that have weakened their constitution, to fine flour that has become a part of their diet, and, eaten in the form of crackers or hard bread, clings to the teeth; to the many acid fruits, such as tamarinds, guavas, limes, etc., to which they have constant access, and to spending their childhood and youth in the school-room instead of wading and swimming in the warm sea, eating raw the fish and shell-fish which they have caught, chewing sugar-cane, and stripping off with their teeth the fibrous covering of the cocoanut.

Dr. Whitney stated after reading his paper that he had many specimens of crania in which the third molar was not erupted, and he had found that it was as frequent among the ancient Hawaiians not to erupt that tooth as among his present patients.

Before the discussion of this paper was opened Dr. G. Toryes, representing the United States of Colombia, was received, and after expressing his thanks gave a short account of his successful efforts in founding a dental college in Bogota as an outgrowth of the inspiration and help he had received from his American teachers and confrères.

"Mr. Bonney told me that he would like to say to us in his official capacity, that this is one of the greatest congresses that have met here; but he dared not go quite so far. He said, however, that it is one of the very best that have been held since the beginning of the congresses in May.

"I also wish to announce that the actual representatives of the American contingent present is 956, and 116 from foreign countries, making a total registration of this Dental Congress, up to a few moments ago, of 1072."

THE CHAIRMAN. The specimens of Dr. Whitney will remain here for examination of the members after this session is closed.

DISCUSSION.

DR. PEIRCE, Philadelphia. I want to express my obligation to Dr. Whitney for his paper, as well as for the valuable anthropological specimens he has placed upon the table. It is rarely that a

body of dentists have the opportunity of seeing specimens that are so emphatically of scientific interest as these presented this morning. Dr. Whitney has brought us into close contact with a race of people that for many hundreds of years, if not thousands, have lived by themselves, have intermarried, and have been shut out from the outside world.

There are many peculiarities in these crania which are worthy of note. The first to which he has alluded is with reference to the third molar. He says that about one-third of the skulls upon the table are deficient, and that shows emphatically that the modification in number and structure of the teeth dates far back beyond the history of these people.

Anthropologists tell us that 200,000 years are required for the modification of the dental tissues of the mammalia, so far as structure and number are concerned. We have another peculiarity here, a very marked one, which we do not find at the present day; and that is, even in this jaw, where we have so much space and weight, we have the third molar entirely deficient; the germ was never developed. Let me draw your attention to the width and the large ramus of the jaw, which mark all the crania on the table. There is not one on the table but what far exceeds, in its weight and width, the modern jaw of civilization.

Some months ago I had the great pleasure of receiving from Dr. Whitney's hands, twenty crania which were presented to the Academy of Natural Sciences of Philadelphia, and each of those bear the same marked feature—that is the ancient crania, the dark colored; those of light color are of recent burial in the sand, and not from the caves; but those of ancient burial, dating back 500, 600, to 700 years, and perhaps older, have this heavy jaw and the wide rami, **which is greater than in those found to-day.**

Another peculiarity which has not been mentioned in a body of dentists before, is the tendency, in ancient skulls, where the tooth has been lost, to a re-development of the process, to take the place of the lost tooth.

In one of these skulls it is very marked; where the upper bicuspid and cuspid and first molar had been lost, the lower jaw has retained the teeth and the friction in mastication of the lower teeth upon the upper process has developed here a sharp incisive process which is the result of use or friction. We find in the large collection of the Academy of Natural Sciences a great many skulls where the teeth having been lost for many months, the friction of the adjacent parts upon the processes has caused a secondary developing process which to an extent has taken the place of the teeth.

In our mature jaws, where the teeth are all extracted by dentists and plates are introduced making pressure over the whole jaw, we may not see such an appearance as in these jaws, the pressure and friction being more uniform.

But in looking over the ancient jaws where the teeth have been out for a long time in one jaw and retained in the other, we find there a tendency to secondary development.

This discovery belongs to Dr. Harrison Allen, of Philadelphia, who was the first one that brought attention scientifically to that fact.

The fact that we find evidences of the presence of all diseases that are found at the present time is a very interesting one, showing that whether pyorrhea, abscess, diseased antrum, or decay, they all existed as they exist at the present time. But how much may be due to the fact that these were an isolated people intermarrying for several hundred or thousand years together, and cut off entirely from the outside world, is a question to be taken into consideration.

There being no further discussion of the paper, an abstract of the History of Dentistry in the United States was then read by the author of the work, Dr. Hayhurst, of New Jersey.

After reading the paper, the doctor noted the fact that no woman's name had appeared in the work, and suggested that some historical sketch be written of the women dentists and be inserted in the work if time allows.

The chairman announced that by special vote, five minutes would be allowed a veteran in dentistry to deliver a few remarks, and introduced Dr. Corydon Palmer, who said:

I belong to that period when the advance in modern dentistry began,—more than fifty years ago, in 1839. Tuition could not be had by a young man, except in the large cities, and for a price from \$300 to \$1000, and no young man was allowed to go into an operating room to see an operation.

During a period of fifty years I have learned things by trying them. If I know anything it is because I have tried it.

I have three ideas I wish to speak of.

First. I would urge you not to practice the extraction of the deciduous teeth in children. It is cruel. It produces irregularity and deformity in future life.

Second. Be careful not to overtask young patients,—girls,—and nervous persons. Don't keep them in the chair too long. I have seen nervous forces and temperaments destroyed by it.

Third. As to the use of arsenic. I began to use it in 1839,

and use it as you will, it is still arsenic. It belongs down below, and if you use it you will have a nightmare that will follow you to eternity.

The president then made a number of announcements relating to the Congress, after which the meeting adjourned to meet Friday, August 18, at 12 M.

SECTION I.—ANATOMY AND HISTOLOGY.

Section called to order by Dr. Sudduth in the absence of the chairman, Dr. Andrews.

The chairman called for the discussion of last night's papers. There being none, the Section proceeded with its regular paper, entitled "The Pedigree of the Central Incisor," by Dr. A. H. Thompson, of Topeka, Kansas.

THE PEDIGREE OF THE CENTRAL INCISOR.

The condition of the upper central incisor in man is something unique, in that while all the other teeth are reduced in form and degraded in specialization, more or less, the central has not only preserved its special form and maintained the practice of its function, but has indeed advanced somewhat, being rather more highly specialized in man, as an effective cutting-instrument, than in some of the lower forms. Its form in man is similar to that of the apes, but the remainder of the teeth of the human denture have degenerated from the completeness of specialization exhibited in those forms.

The lateral incisor, while highly developed in most individuals, is frequently reduced in form and sometimes is totally absent. This is never exhibited in the central incisor, but it is the case with the cuspid. The bicuspid, molars, and lower incisors also show the effects of degenerative modification; the central incisor alone maintains a high degree of completeness and specialization in man, which fact makes a study of its genetic evolution a matter of peculiar interest.

The function of dividing and cutting food is performed by various organs throughout the animal kingdom, and even teeth for cutting are developed very low in the scale of life. The cephalopods have cutting-teeth placed on the odontophore, but these are not true incisors. The insects and crustaceans cut by means of the mandibles, and the "pinchers" of the anterior locomotive organs, which are not true teeth. The leech, *Neresis*, and other worms have saw-like mandibles which are not properly cutting-teeth. In

fact, the lowest form in which teeth with any approach to the true incisor form are found, is the sea-urchin, *Echinus*, which has five incisors arranged around a central point, in the remarkable apparatus called "Aristotle's Lantern." They are used with great force to cut shells and rocks. These teeth are set in true alveoli, and are worked by powerful muscles. This is the lowest form in which true incisors are found.

In the fishes there are no incisors, properly so called, unless we consider as such the cutting-teeth of *Sargus*, etc., for the so-called teeth are ankylosed to the maxillary bones.

None of the reptiles have cutting-teeth proper; all of their teeth are pointed for seizing and holding prey. The beaks of turtles are analogous to incisors, but are not homologous with them. The same may be said of the bills and beaks of birds.

Most of the lower mammals are deficient in regard to incisors, usually having teeth on the sides of the jaws for grinding purposes only. The kangaroo has large cutting incisors, as it is an exclusive vegetable-feeder. Others of the marsupialia are variously armed, as they may be herbivorous, carnivorous, or insectivorous. In the rodents we find the central incisors developed wonderfully into the long, continuously growing implements used for cutting.

In the herbivora all of the incisors and also the canines are highly developed for cutting purposes. A curious exception is noted in the ruminants, the most of which have no incisors in the upper jaw. In the carnivorous animals the canines being excessively developed and the cutting function being usurped by the long-bladed sectorials, the incisors are much diminished. In the elephant and mastodon the central incisors are developed into long tusks, which are employed as effective digging implements and piercing weapons.

With all these, however, man has little relationship. With those that remain to be noticed we find the path of the evolution of man and the stages through which his teeth have passed to reach their present forms.

Beginning with the Insectivora, the living representatives of an order which was the apparent predecessor of the Quadrumana through the Lemuridæ, we observe that this order presents many remarkable forms of the central incisor. In some of the moles the incisors are small, and in others like a canine with deep grooves. Owen says, "In the shrews the central is very large, with a large talon on the basal ridge, making a deep notch into which the procumbent lower central closes with a hook-like point." This talon, with the deep groove or sulcus, is sometimes reproduced in man, with

the characteristic backward curve of the body of the tooth. "The typical shrew usually manifests rodent analogy by the superior size of the anterior pair of incisors in both upper and lower jaws." But this resemblance is only in regard to general contour. "In *Sorex* the large upper incisors appear bifurcate, from the great development of the posterior talon." This talon is often repeated on the lateral incisor in man, where a lingual cingulum is not uncommon. "The hedge-hog has large centrals, sometimes with a large interspace." This is perhaps the precursor of the large interspace, which is often present in man, and is so frequently a matter of heredity.

In the Cheiroptera, which are closely related to the Insectivora, the incisors are most variable and may be entirely absent. Some of the curious forms exhibited in the insectivorous series are passed on and reappear in the Quadrumana, and occasionally in man.

In approaching the Quadrumana, the highest branch of animal life related to man by collateral descent from a common ancestor, the lowest family of the order is that of the Lemurs. Some of those are closely related to the Insectivora as regards form, habits, and dentition.

The Lemurs present considerable variation in the form of the central incisor, which advertise relationships with many groups below them and present forms which are very aberrant. Tomes says, "Most of the Lemurs have upper incisors which are small and widely separated from each other." One of the lowest, and one closely related to the Insectivora, is the little flying Galeopithecus. Owen says, "In the Colugo the two anterior incisors of the upper jaw are separated by a wide interspace. In the Philippine Colugo these teeth are small with a simple bilobed crown, but in the Galeopithecus the crown is expanded into a plate with three or four tubercles. . . . The lower centrals present the form of a comb produced by the deeper extension of the marginal notches into the crown. These are analogous to those on the edges of the human incisor, but the notches are more numerous and deeper." This tendency to division is recalled by the tubercles upon the edges of the incisors of man when first erupted. The longitudinal ridges which lead away from the tubercles are also suggestions of this primitive division of the crown, as an embryonic record of the history of its evolution. This was apparent to the great anatomist Owen before the day of philosophic evolution, and in our day the lesson is beautiful and striking.

In other forms of the Lemurs the incisors are projecting, long, and narrow, and interdigitate with the procumbent lower incisors, which pass between them for cutting vegetable fiber.

The lowest monkeys, the Platyrrhines (or wide-nosed), the American species, are closely related to the Lemurs in many respects, notably in having the third premolar. The central incisor begins to approach the final form in the higher groups, but is still somewhat aberrant. Like the Lemurs, the incisors of both jaws are directed more obliquely forward, and so are less vertical than in the higher apes and in man. As these are approached, the incisors become more erect, and the form of the crown is, in consequence, less curved, for in the higher primates it is straighter and more in a line with the long axis of the root. In the Platyrrhines it is still more or less of a scoop shape, resembling the Lemurs. The scoop shape is often recalled in man, with the characteristic curve and thin edge.

In the Catyrrhines (narrow-nosed), the Old World monkeys, the centrals are much wider and larger than the laterals, but nearer the shape found in man, even in the lower form. In some of the baboons there is more or less of a basal ridge, which is often greatly developed on the lingual face. This lingual ridge is often recalled in man, but not on the labial face.

In all the Anthropomorpha the centrals are much larger than the laterals, are more vertical than in the lower forms, and assume the final shape presented in man. There is little real difference in the form of the central incisors between the higher apes and man, except in size and quality of structure and in the comparative size of the centrals and laterals. In man the extreme disproportion manifested in the apes is much reduced,—*i.e.*, the centrals are smaller and the laterals are larger.

The Gibbons are the lowest of the tailless apes. Their centrals are large and strong, nearing the final human form, except that they project and are somewhat of a curved form. In the Orangs the centrals are of great size, are twice the size of laterals, and have the basal ridge. This extreme size is recalled in man by those examples which we see of excessively large centrals. Tomes says these teeth are similar to those of man, but larger. In the Chimpanzee the centrals are very much reduced from the size in the Orang, and approach the proportions of the same teeth in man, but with a prominent basal ridge as in the Orang.

In the Gorilla the centrals are still nearer the final shape as in man. They are of the same form and proportions, but are larger and of coarser structure than in man, as are all of the teeth of the greatest ape. There is little real difference between the central of the higher apes and man, for it assumes the final shape long before man is reached, and must have taken on this form before the dif-

ferentiation which separated the human branch from the quadrumanous.

As showing the persistence of type and the singularity of the survival of this tooth in such perfection, we find that the central incisor of man has lost nothing in the course of the evolution of the species; and yet it is little elevated above that of the apes. In fact, the general structure of the denture of man is degraded and primitive. The central has lost nothing in the process of the destructive evolution of the species, for while the other teeth have been degraded, it has maintained its own and is really superior to the others in the retention of the perfection of its functional specialization.

DISCUSSION.

DR. EBEN M. FLAGG, Asuncion, Paraguay. I would like to ask if the doctor thinks that the central incisor in man has reached its complete culmination, or whether, as Dr. Bonwill says, that it started and has since degenerated.

DR. THOMPSON. We can hardly expect that the cutting function will be much increased. The chances are that with the rest of the denture it will follow rather in the line of degradation than advancement. Many of the teeth of the human denture are much degraded, and some are on the road to entire disappearance. The third molar is very erratic, and I think is being lost. The next is the lateral incisor, which also will probably disappear. The central incisor is really unique, because it does not indicate so much degradation as any of the other teeth.

DR. SUDDUTH. In what direction does Dr. Thompson think this retrogression will present itself, whether as to crown or root, or in what form will it occur?

DR. THOMPSON. There is only one way to answer that, and that is, that the lessening function will necessarily lessen the impulse of development in a particular organ. It is a question whether, in the higher development of the species, the teeth will be entirely reduced and destroyed. I imagine they will be preserved for other functions through the law of collateral variation. I am not inclined to be as confident now of the entire loss of the teeth as I was at one time. The collateral variation will tend to the preservation of teeth for other functions than mastication.

DR. SUDDUTH. I have noticed in studying collections of teeth in relation to dental anatomy, that there seems to-day a larger proportion of short-rooted centrals than there used to be. It may be that I have within the last five years come across a larger proportion, accidentally, but it seems to me that in handling many thousand

teeth each year, as I do now, that I have been struck with the point that very many central incisors had short, stunted roots. The query has come to my mind whether that is not a part of the necessary process of retrogression, which comes from the lack of the use of the teeth in this country where we use so little hard food, and our food is prepared in a soft form. That is why I asked the question. This is also in keeping with my remarks last night, in regard to the effect on the roots of the teeth and not on the crowns.

DR. ABBOTT. Dr. Thompson's last remark rather broke me up, because there was a time when the doctor was very sure that it would only be a few years before we would be without any teeth at all; and I am glad he has arrived at the conclusion that we will have teeth, notwithstanding the fact that we grow older. I have never seen anything to convince me in the slightest degree that we are to become edentulous, or that we are to lose the use of a wisdom-tooth or the lateral incisor or any other. I believe to-day that we stand just as good a chance for a good set of teeth as we did thousands of years ago. In the skulls presented this morning in the general hall, there is a chance for study and observation. I have a theory in reference to the stunted condition of teeth, that it is due to a specific trouble or disease in the system. You know very well that the papillæ of teeth are affected very easily by disease, and that that disease may be so obscure that it may not be noticeable to the individual or any other person; and still you can find out that such and such a thing produces the disease, and if we would turn our attention to that one direction, to the history of the individual from generation to generation, we would find that one of his ancestors would have presented sufficient cause in his condition for us to believe that the disease was transmitted to the individual. I have felt that there was an opportunity for a great deal of real study in that direction. That nature herself for want of use is to dispose of the teeth, in part or in whole, I cannot conceive; for I have never seen anything to make me think so.

DR. THOMPSON. In regard to the law of heredity, as to the teeth being transmitted, that is not in the line of the doctrine of evolution, but in regard to the shortness of roots of which Dr. Sudduth spoke, I think that is a matter of temperament, or of ethnical peculiarities, because there is no doubt that there are distinct racial types of teeth, if we could diagnose them, just as there are of other parts of the body. That follows in the line of evolution and change. Of course the changes that are brought about in the evolution of the species are not to be noticed in the lifetime of any individual,

or in fact of any nation; but it all shows the influences that affect the development of the teeth.

Dr. Eben M. Flagg, of Asuncion, Paraguay, then read his paper, which was entitled, "The Human Temperament in its Relation to the Human Tooth."

THE HUMAN TEMPERAMENT IN ITS RELATION TO THE HUMAN TOOTH.

During the past ten years, dentistry has attained to a greater degree of scientific precision. Certain studies, whose paramount importance was not formerly recognized, have been added to our curriculum, and the result has been to subordinate the purely mechanical branch of our labor, which for so many years preponderated to the detriment of other studies equally important.

Without intending to undervalue the remarkable triumphs achieved in dentistry through mechanical science, and awarding due honor to every department of mental labor that tends to enlarge the sphere of our usefulness, I have now the honor to invite your attention to a consideration of the human temperament in its relation to the human teeth.

Every person possessing the faculty of observation must have noticed the remarkable differences that characterize individual members of the human family.

The term that has been used to express these differences in the physical and mental constitution of individuals is temperament, from remote antiquity; and although it has been urged quite recently by some that it does not adequately express the phenomena under consideration, no better word has yet been proposed by those who disapprove of it, and until some superior successor is proposed we must continue so to use the word. The fact that it has stood the test through all the varying developments of this study, from its simplest beginnings to its latest elaborations, should do much toward inclining us to the retention of the word, for no matter how much temperamentalists may have differed as to the way this study should be pursued, all have tacitly agreed that the word was appropriate to express the ideas sought to be conveyed. Hippocrates taught (B. C. 460 to 351) that "there were four humors in the human body, namely, blood, phlegm, yellow bile, and black bile, which give rise to its various modifications," while Cullen (A. D. 1710 to 1790), he who was the preceptor to Dr. Wm. Hunter, would not admit of the existence of more than two temperaments, namely, the sanguine and the melancholic.

Various theories have been advanced to account for those dif-

ferent mental and physical qualities under consideration which inhere to man and are not possessed by any other animal, and it has been sought to prove that they are but the results of his environment; that they are produced by his surroundings, such as soil, climate, locality, habits of life, etc., upon his physical and mental frame, but no special temperament is the sole property of any special locality. Wherever the Caucasian race is found, there we find manifestations of all the temperaments; and though there be localities where a certain combination of temperament is in the majority, so to speak, there is no place occupied by civilized man that is not represented by all of them or where the soil, climate, or environment had had the power of eradicating even one of them. So concerning the cause of the temperaments I feel impelled to take an agnostic position, to say candidly I don't know, but have all hope that future investigations will bring us nearer to the cause. If I may be permitted to hazard an opinion, I would suggest that the temperament seems to be due rather to mental than to physical causes. Darwin has abundantly demonstrated that the force of function tends to determine the form of the organ, while in everyday life, how often we notice that habits of mind can produce a change in the expression of the body, more certainly than mere habits of body can produce changes in the mental constitution. The mind of a Robert Burns can elevate the coarsest toil more certainly than the coarsest toil can degrade the mind of the man. Mind and body undoubtedly act and react upon one another, but where both are given free play it seems to be in accordance with the law of nature that mind should predominate. In speaking of mind I mean the function of the brain.

Adhering to a belief in four elementary temperaments, the writer tabulated a classification ten years ago. These tables have been extensively published during that period, and have withstood the test of criticism as well as might be expected. They are presented now with a few modifications in wording rather than any change in substance, though the writer would be happy to make a change if the future discussion shall have revealed errors in their composition. [The classification referred to was published in the DENTAL COSMOS, February, 1884.]

I have said little or nothing concerning the mental phase of the study, for the reason that in a society so intensely artificial as that produced by what we call the civilization of to-day, there is such a constant pressure brought to bear against the development of individuality, and such a continuous effort to force the production of what shall be deemed fashionable rather than what is natural, that

it is often difficult to evoke from the individual any expression of thought or any action that is not more or less under restraint. To get at the true inwardness of the mental constitution of the individual we must know how he or she would act in case of a sudden emergency, when there is no opportunity for previous mental preparation, or when the tension of mental discipline is relaxed, which in the present state of society is wellnigh impossible. This domination of fashion seems to come from a desire to reduce the manifold and complex manifestations of character to act only through one channel, and it makes us more prone to dogmatize than to analyze. I believe that the revival of the study of temperament would do much to correct this condition of error.

There is nothing more useful to demonstrate the folly of fashions than this same study of temperament, for fashion would make us monotonous, by means of suppression, restriction, or a species of hot-house forcing of the mind, while the action of temperament, if it is given liberty, would tend to make us harmonious through natural combinations. One proof of this is that we never see any temperament standing alone. In classifying the elementary temperaments we can only advance principles, valuable no doubt as formulæ for study, but not met with in nature uncombined, whilst in the combined temperaments we can describe persons and produce portraits that imagination can recognize. If we would describe a person in whom the bilious temperament predominates, a good example is that combination known as sanguo-bilious, the substantive bilious, indicating the basis of the temperament under discussion, while the adjective sanguo expresses the modifying temperament. Prof. J. Foster Flagg has tabulated the binary temperaments, and with his permission I will present a few examples. "More than average size, tendency toward irregularity rather than rotundity in form, in male and female. Complexion and skin fairly smooth, but little color, dark and yellow in its tinting; cheeks broad, forehead square, good size; jaws large, angular and strong; chin square and large; hair black or nearly so, coarse and curly, but usually not luxuriant in quantity. Beard is universal rather than handsomely set, eyebrows decided but usually more straight than arched, eyes very dark or black and strong rather than lustrous in expression, lips average in size, inclined to large and of a brownish red, nose large and decided in contour."

This is the sanguo-bilious combination, and fairly typical of the bilious temperament. To this classification belong such characters as Abraham Lincoln. Is not the description nearly sufficient to enable an artist to paint his portrait? The indications of the sanguineous

temperament are well brought out by that combination known as *nervo-sanguine*, to which Prof. Flagg gives "more than average size, well built, marked depth of chest and breadth of shoulders; complexion and skin fair, and finely florid; cheeks full, forehead good, jaws average, full and round; chin average and round; hair sandy to red, full in quantity and fair in quality; beard sandy to red and wavy, eyebrows light and arched, eyes light and hazel to clear blue, usually larger than average; mouth average size, but with a fullness of lip which gives the appearance of more than average. Lips full and red, nose usually shapely and inclined to large.

The only popular character that I call to mind at present who answers to this description is the political economist, Henry George, and I think his friends would have no difficulty in recognizing the likeness, while the *lymphatico-sanguine*,—a very valuable combination of temperament—is fairly represented by President Cleveland. A temperament in which the nervous basis is indicated may be seen in the *sanguo-nervous*, of which Napoleon Bonaparte is a good type, while the characteristics of the lymphatic temperament are brought out by the combination known as *bilio-lymphatic*, referring you to Prof. Flagg's tables for a description of the same.

Thus we see how every phase of character, every form of feature, every mental endowment may be more or less identified through a discriminating study of temperament. It would lead us to study our patients generally before examining their mouths, and indicate beforehand, with more or less certainty, the character of the trouble that the patient would be most likely to suffer from. It would do much to settle the disputes which men, equally conscientious in their research, are prone to engage in, through the mistaken idea that humanity can be reduced to a kind of level and every aspiration of man be forced to act through one channel; and it would also help dentists to solve many problems that are now the subject of dispute or involved in obscurity. Let me illustrate—I read from the *nervobilious* temperament, as described by Prof. Flagg: "Whether tall or short, of average size, average osseous muscular and contour development, complexion and skin inclined to dark, high cheekbones, forehead large, jaws small, chin small, hair dark, usually decidedly curly, of average quantity and quality, . . . eyebrows decidedly marked, but not decidedly arched, eyes very dark brown, average size but with much perceptive expression, mouth average size, lips thin and shapely, nose usually very shapely with slight or decided tendency toward *aquiline*, teeth a combination of yellowish and bluish colors, enamel good, dentine soft, size and form of teeth long and narrow with long cusps."

Here we have a union of two temperaments that would seem more or less incompatible. The tall, massive, angular, square-built frame of the bilious, joined to the slight, delicate, but erect and well-proportioned frame of the nervous. Prof. Flagg with his usual power of penetration has presented us with a description that can be clearly recognized with the mind's eye, and I would ask any dentist of average regular practice if he has not observed how many patients answering to this description are strongly inclined to dental irregularities, and how this must be the case where the small jaw of the patient partaking of the nervous temperament may be provided with the large tooth belonging to the bilious.

Illustrations could be multiplied indefinitely, but enough has been said to illustrate the importance of the study to the scientific dentist and to prove that we cannot afford to ignore it.

DISCUSSION.

DR. THOMPSON. The paper struck me as being something which needed expression in our college work. I have had occasion to regret that there was nothing explicit in our literature which we could use in our instruction to the student in regard to this particular thing. It is very necessary that the practitioner should be able to diagnose the different temperaments, particularly in regard to the making of artificial teeth for edentulous patients. It is very important for the young practitioner to distinguish at least one temperament which predominates in the individual. The question is very difficult and obscure, of course. It may have an ethnical basis, but we know that in all nations and races there are differences in the individuals which are temperamental, and which may almost be called racial differences. It is possible that temperaments may have originated in the early development of the races, their evolution from the earliest form; but of that we know nothing. We cannot say to-day that any races with which we are acquainted have any predominant temperament. The temperaments are more manifest to us in Europeans than any other races, on account of our greater familiarity with them. Temperament exists among other races and influences the individuals just as much as in the European races. It exists also in animals. Some horses are more nervous than others, and have a different organization. That brings us back to the idea of the men who first described temperament, that it may be organic and not ethnical after all. The question is still very much confused, and in want of light, and any contribution to it is very valuable.

DR. SUDDUTH. The subject of temperament is one that has interested me very much, and as Dr. Thompson says, it should be taught in our colleges. I have always had an interest in the study of

physiognomy. In the face we have depicted the attributes of mind, and to a certain extent the innermost thoughts of the individual; in addition to that, dentally, the teeth are also types of temperament. There is a correlation between the physiognomy and the teeth; a marked analogy which can be borne out, certainly exists. Given the teeth of an individual, one who is well up in those studies can tell you what the physiognomy is, or given the physiognomy can tell you what will be the teeth. There is a great correlation between these two features of the anatomy. I used to lay a great deal more stress upon the study of temperament than I do at the present time. I was carried away with it to a certain extent, and started in to mold and modify my practice, based upon the temperamental attributes as depicted in the study of the teeth. I believe that there is a great deal in it. I cannot help but believe that a scientific study of the temperament, especially of the physiognomy, will give a person an insight into human nature to such a degree as to make him more successful in life than persons who do not understand those things. A successful business man can, at a glance, take in the temperament, and the mental and physical characteristics of the individual with whom he deals, although he may not be able to put it in a tabulated form as Dr. Flagg has done. If dentists would make more of a study of this, I think they would be more successful. Many of us study and practice dentistry from the standpoint of the forceps and plugger, and let the business part take care of itself.

There are two sides to dentistry, however, and a man ought to study them both. There is no doubt but that temperament has very much to do, as Dr. Flagg has indicated, with the intensity of inflammation. That is a point that has been described and is well known. For instance, a sanguine temperament is one in which we have all inflammatory processes taking on a very acute form. Not only does the sanguine temperament tend towards acute inflammations, but if the remedy is applied in the right way the inflammations respond readily. The lymphatic temperament is, to a more or less extent, a negative temperament. It does nothing in a very vigorous way, either as to getting sick or getting well. It is a slow, sluggish, and undesirable temperament to possess or to treat. Every one should have some special line of research that will take him out of the humdrum of every-day practice. I take it from what Dr. Flagg has said, that he takes pleasure in this particular kind of work. We have had an able work from him, and one that I am glad to have presented before this Section.

DR. THOMPSON. One thing which has retarded the develop-

ment of this question has been its association with the science of physiognomy and phrenology. Every man who looks at these things is generally struck with their absurdity. The study of temperaments has been associated with them, and has been dropped without leading a man to any definite conclusion in regard to it.

DR. FLAGG. Dr. Sudduth remarked that he paid more attention to this subject formerly than at present; that he had been somewhat disappointed as to the value of temperament as a study. There are to-day, as there were in the time of Shakespeare, "Men whom nature makes by scores and hundreds, and puts no mark upon them," and of course there are many in which the temperament is so obscure, that one in trying to reason out what that temperament is would almost be inclined to say that temperament is a fraud. I account for that in the tendency that has arisen for certain fashions to predominate, and either through dress or some other pressure has brought us to a dead level, so to speak, and so temperament has not had what we would call a fair show. In regard to its being allied to the pseudo-sciences, it is true that we have, in considering temperament, unthinkingly been brought to consider such studies as phrenology; but I think as to palmistry and phrenology that their truth, on scientific bases, may be found in temperament. We know that at first astronomy was considered a divining art, thoroughly hateful to the Church. We have seen that astronomers were burned at the stake for saying they could discover the true position of the universe. Astronomy now stands as a real science, and upon as high a plane as any of our sciences. Although I have not been able to make as full a presentation of the study as I would like, I think if my paper will serve as a basis to interest scientific men in the subject, that I shall feel fully compensated for any study I have made in this direction.

Adjourned.

SECTION II.—ETIOLOGY, PATHOLOGY, AND BACTERIOLOGY.

The chairman, Dr. Black, called the meeting to order. Dr. I. P. Wilson read his paper, of which following is an abstract :

PATHOLOGICAL CONDITIONS OF THE AIR-CAVITIES OF THE CRANIUM RESULTING FROM DENTAL LESION.

Diseased conditions of the air-cavities of the cranium are of frequent occurrence, and very often of uncertain origin.

Nasal catarrh is usually the outward manifestation of these pathological conditions, the nose being the only outlet for the secretions from these cavities.

An exploration of the nasal fossæ will reveal the fact that more than a score of chambers or cells open into this convoluted passage.

We find that all these cavities communicate freely with the nostrils. We also find that one continuous stretch of mucous membrane covers all of these uneven surfaces.

A pathological condition of any one of these parts must, therefore, necessarily endanger the health of other parts continuous therewith. These diseased conditions are usually known by the ambiguous name of "nasal catarrh." The seat of the disease is too frequently overlooked, and treatment is directed to the *effect* and not to the *cause* of the malady.

The object of this paper is to call attention to the fact that pathological conditions of any or all of the air-cavities of the cranium, not unfrequently have their origin in dental lesion.

Remembering that the apices of the roots of the first and second superior molars are separated from the maxillary sinus only by thin plates of bone, and that in some instances these roots penetrate the floor of the antrum, with nothing but the soft tissues of the mucous lining covering them, we can readily understand how easily an outlet can be gained for putrescent matter and gases through the antral cavity, and into the nose.

When an abscess forms at the root of one of these molars, pressure is brought to bear upon the tissues surrounding the apical portion of the root, and usually after days of great suffering the weakest point of the surrounding tissue gives way, an outlet is formed, and the poisonous matter is discharged either into the antrum or into the oral cavity. The acute form of the disease then subsides, the suffering is relieved, and a sluggish and more insidious form of the disease begins.

The pulp-chamber and the canals of the tooth causing the difficulty contain the remains of the decomposed pulp, and the gases continually generating therefrom.

The only means of escape for the septic matter and effluvia is through the opening that nature has formed, and if this be into the antrum the mucous membrane of that cavity must very soon become diseased from the contaminating influence of the virulent matter and gases that will be continually thrown upon its delicate structure.

But its baneful influence may not stop here. After possessing and polluting the antrum, it passes out through the ostium into the middle meatus of the nose, and the cavernous passage is bathed with the infectious discharge.

The erect position of the body during the day, the recumbent position at night, lying sometimes upon the back, at other times

upon the right side, and then upon the left, carries the poisonous matter by gravitation to almost every surface above described.

But should any of the cell-membranes escape actual contact of the virus, none of them can escape the effluvia that must take possession of every air-cavity associated with the nasal fossæ.

The exclusion of pure air from these chambers, and the continual presence of noxious matter and gases, will carry contagion from one compartment to another, until disease has fastened itself upon the susceptible tissues of the mucous membrane, and the whole cavernous passage has become involved.

A detailed report of a single case will be sufficient to illustrate the subject under consideration.

About two years ago, Mrs. C., the wife of a clergyman from a neighboring town, consulted me with regard to a diseased condition of her teeth. She complained of a dead, heavy pain in her cheek-bone, and "under the bridge of her nose," also in the frontal region. Her eyes had a languid appearance, and were continually discharging a water-like substance. In addition to these distressing symptoms, she was greatly afflicted with "nasal catarrh." Her breath was exceedingly offensive, her nervous system shattered, and she seemed to be a physical wreck. The catarrhal discharge from both the anterior and the posterior nares was loathsome to herself, as well as annoying to her immediate family and friends. Realizing this, she isolated herself as much as possible from her household. She partook of food sparingly and without relish. The sense of smell was greatly impaired, and the resonance of her voice was gone. Life had become a burden. In this condition of body and mind she accompanied her attending physician to my office. I found the superior second bicuspid and the first molar on the right side had been filled many years before. Soon after they were filled, one or both of them had ached, followed by a swollen face. Since that time they had given her no trouble, and she supposed them to be in good condition. Both teeth were found to contain putrescent pulps, with no visible means of escape for the foul matter and gases that were continually forming. This suggested the probability of the outlet being into the antrum. The teeth were both extracted, and an opening found through the alveolus of the anterior buccal root of the molar into the maxillary sinus.

After enlarging this opening, about an ounce of warm water was injected into the cavity, and a large amount of corruption was forced through the ostium into the nose. An exploration was then made, and a thick cheesy substance (dehydrated pus) was found stored away in the recesses of the sinus. An hour was spent in removing

this corruption, and in irrigating the cavity with water containing a few drops of carbolic acid.

The second day following, an antiseptic wash was again used in thoroughly drenching the parts. This treatment was continued from time to time for a month or six weeks, when a normal condition of the antrum was re-established. The distressing feeling in the ethmoid region, however, still continued, though the catarrh was greatly diminished.

It would have been well at this time to have turned the case over to a rhinologist, but there being none in my town, nor where the patient lived, I directed her to cleanse the nostrils thoroughly every day with a solution of chlorid of sodium, and in due time report to me the result. In less than a year the catarrhal trouble had entirely subsided, and the general health was completely restored.

The treatment in this case was very simple; medicinal agents were used sparingly. Keeping the diseased parts thoroughly cleansed aided nature in her benign work of restoration.

In tracing the history of the case, we found that the difficulty originated in the diseased teeth. Then followed the antral disease, and later on the air-cavities in the ethmoid region yielded to the bad influence of associate parts, and finally the whole paranasarium became the seat of a loathsome disease.

Prior to this difficulty the lady had always enjoyed excellent health, so that no constitutional tendencies to disease stood in the way of a rapid and complete recovery.

Had she been of a scrofulous diathesis a more persistent course of treatment would have been required, with much greater uncertainty as to results. In other words, when a pathological condition of the air-cavities of the cranium is found to be due to diseased teeth, or any local cause, we may confidently expect to be successful in our treatment after removing the lesion. But if the origin of the disease is of a constitutional character, local treatment will not be sufficient to effect a cure. Eternal vigilance in cleansing the parts may palliate and hold the disease in check, but back of all lies the predisposing cause, which can only be met through systemic treatment.

When local or constitutional disease has its origin in dental lesion, it behooves the dental practitioner not only to detect and remove the cause, but to intelligently and successfully treat the case; remembering always that if the effect of dental lesion and antral disease still lingers in the upper air-cavities, and will not yield to personal cleansing of the parts, the future and final treatment of the case properly belongs to the rhinologist.

A large majority of these cases I have been called upon to treat have been entirely cured, and although the catarrhal condition of the cells associated with the posterior nares has been last to yield to treatment, yet hygienic living and scrupulous care in cleansing the parts has usually been sufficient without further treatment.

In cases of a strumous character, the tendency to caries of the spongy bones is greatly increased. I have, however, met with two or three cases of long standing where necrosis of the fragile structure immediately surrounding the ostium of the antrum, and of parts of the ethmoid tissue had taken place, yet these persons had previously enjoyed robust health.

Tracing the history of these cases carefully, I have found that nature's first signal of danger was an aching tooth, followed by inflammation and swelling of the face. The acute form of the disease had subsided in a few days, and a catarrhal discharge from the nose followed. The pulp of the aching tooth was now dead and putrid, and the poisonous matter and gases generated therefrom were discharged into the antrum. But little more than an uneasy sensation in the region of the sinus was experienced for a time, but the symptoms of nasal catarrh continually increased. Months and years passed; the disease became chronic, not only in the antrum but in the ethmoidal cells.

The muco-purulent discharge into the middle meatus of the nose, and upon the mucous membrane of its associate parts, though resisted by vigor and health of body for a time, finally yielded to the septic poison to which the parts were continually and unrelentingly exposed. The soft tissue surrounding the projecting processes had broken down, and necrosis was the result.

The thin plates of bone so often found rising from the floor of the antrum, the fragile frame-work which supports the soft tissues around the ostium, and the paper-like structure of the ethmoid are first to be divested of their mucous membrane and their life-supporting periosteum. This is necessarily so from the very nature of their anatomical formation, and because of both sides of these thin processes being so long, and continually exposed to the contaminating influence of their environments. The solution of the foreign substances then takes place, and is usually carried away with catarrhal discharge.

The evidence of this loss of osseous tissue is found in the fact that the ostium is greatly enlarged, the sense of smell has been destroyed, and the voice has lost its former resonance. The fact may also be established by ocular demonstration.

I have found a change of medicinal agents beneficial in the

treatment of these cases. Oil of cassia and oil of eucalyptus, properly diluted, are valuable remedies. Other antiseptic lotions have their value. These cases may be effectually cured with a vigorous, untainted constitution to aid us in our efforts.

When the soft tissues that cover the frail processes are broken down, the ragged edges of bone thus exposed are a source of irritation to the mucous membrane all along the line of demarcation between the dead tissues that have been thrown off, and the living tissues that remain, so that morbid growths in the antrum and in the nose frequently have their origin from this provoking cause. Nasal polypus usually commences in or near the outlet from the antrum. This is a significant fact.

The soft tissues surrounding this straw-like opening are most exposed to the deadly virus that passes from a diseased antrum into the nose. Broken-down tissue and morbid growths usually commence at this point, the polypus sometimes developing into the antrum, and sometimes into the nose.

A mistaken diagnosis is too often made here. The mechanical obstruction thus produced is by no means the *cause*, but the *result* of the antral disease, and back of all may usually be found a dental lesion.

Medical writers upon pathological conditions of the ethmoid cells, and the other air-cavities of the cranium, including the antrum of Highmore, rarely ever mention the teeth as even a possible cause of disease in these cavities, or as in any way affecting the general health.

Diseases of the human teeth, and the dire consequences that so often follow, not only in the direction where equally grave results so often manifest themselves, involving the health and happiness of thousands of human beings, should be a matter of the greatest concern to both the medical and the dental professions.

DISCUSSION.

DR. FRANK ABBOTT, New York. I have had more or less experience with the subject treated, and have met with much the same experience as Dr. Wilson has stated. I have arrived at several conclusions; first, that medical men, as a rule, do not take into account the conditions that present themselves on account of the diseases of the teeth. They would, for instance, treat for years a case of nasal catarrh, and the patient might die on their hands and they never ascertain the cause of the trouble. It is catarrh, and of the most violent form, passing from one cavity to another.

The second conclusion is that in all cases of disease of the antrum it is almost and entirely sufficient to first remove the cause of

the trouble and then keep the parts clean, and unless that idea of cleanliness is followed out it makes no difference what is used in the way of antiseptics or anything else. The parts must be kept clean, and if that is done it is the best antiseptic treatment that can be thought of. This may be done with warm water alone, or with a little salt added. Many people are reckless in treating these cases, forgetting that the cavities are lined with extremely sensitive mucous membrane, because they are so inclosed from outside influences with the exception of the air in them, which is almost stationary, and that is why they are so sensitive. If anything is thrown in that is below the temperature of the body, more or less depression of the mucous membrane is produced by the shock. If you use an antiseptic with the idea that you can destroy the disease, you produce more trouble than you had to start with. I have seen cases where carbolic acid had been used so strong that the bone under the orbit was denuded of mucous membrane for a space as large as the thumbnail, where the material had been thrown in with a syringe. Carbolic acid may be used by properly reducing; plain water will cleanse if you throw enough in the proper direction. A syringe-point should be used that has fifteen or twenty perforations in every direction. By throwing in the material slowly, it will wash it out everywhere.

DR. INGERSOLL, Keokuk, Ia. The subject illustrates one fact, and that is the influence of small causes in producing serious results.

I do not think medical men or dentists have sufficiently considered the importance of the smallest causes when long continued. Prolong any irritation, and it becomes a very serious irritation. Let a drop of water fall on a man's head, and no harm is done; but let it continue for days, and the drops of water will drive the man insane.

Let a mote be thrown into the eye. At first it is scarcely perceptible, but it may produce the most serious results. A little pulp is left in a canal. It may go for years without giving trouble, but subsequently the trouble comes.

DR. BLACK, having called Dr. L. L. Davis to the chair, said :

I wish to speak of a case which perhaps should go on record in this connection. A gentleman went to my son for entrance into the Sanitarium at Jacksonville. I saw him, and found he was affected with some obscure disease. He was unable to turn himself in bed, and in connection with this there was a mild form of insanity. He was a bachelor of about fifty-five years of age. After a few days' study of the case my son made out a case of Addison's disease, and yet there were some puzzling symptoms. The condition of the nostrils was looked to, and it was found there had been some disease there. During the time he was there he had symptoms that

did not seem to belong to Addison's disease. Finally he died with cerebral symptoms. A post-mortem was held, and Addison's disease was found. I suggested that the skull be opened. It was done, and we found under the anterior part of the brain, over a considerable portion, a large pus-pocket that had evidently been the product of nasal catarrh and the immediate cause of death.

DR. CHISHOLM, Tuscaloosa, Ala., mentioned a case which came to him a few months ago, where the patient was suffering violently from acute pain about the Eustachian tube, although it was not indicated by any external marks. His physician treated for catarrh in every way that is ordinarily known to physicians, but without success. He was sent to Dr. Bosworth, of New York, who took the case in hand, but no relief was afforded. A few days before I left, his physician called me in for consultation, and asked me if it could be related to any condition of the teeth. On examination, I found the slightest soreness of the left superior first molar and the first bicuspid. I extracted the first bicuspid, and three days later the pain had subsided somewhat. On the third day I extracted the other, but still he continued to linger in this suffering condition. I recommended the perforation of the antral cavity, but the physician objected to it. It is a very peculiar case. Since I left home I have been written that they had excised a portion of the nerve; that they had opened into the antral cavity and that it was diseased somewhat. At the apex of one of the roots there was a very small enlargement. I believe it would have been well to extract every tooth, if necessary, to discover the location of the trouble.

DR. A. O. RAWLS, Lexington, Ky. I have noticed frequently the origin of this trouble in the antrum would come from the frontal sinuses. We are all the time fighting the disease from the antrum when it ought to be fought from the sinuses. He thought that Dr. Abbott was right in stating that we were over-treating with antiseptics. Anything that changes the structure of the mucous membrane would act as a poison to it.

There are times, however, when it requires something more than cleanliness. Water does not always clean; we often need to use something different to secure cleanliness, as we bring about a new condition and new development of tissue. Dr. Williams perhaps gave the best definition of what catarrh is. He claims that the development of the epithelial cells is so rapid that they are wept off and leave a continuous raw and imperfect surface at all times and in all cases. We must have a change of the organization of the surface and water, or cleanliness will not always do that alone. We must

have something that will bring about a new condition of the membrane.

DR. G. VARGAS PAREDES, Colombia, S. A., said that he had a good deal of experience in the matter, and mentioned the case of a young man where the antrum went so far forward as to reach the root of the cuspid. He cleansed and explored it, and washed out a great deal of pus which was found throughout the antrum. The root of one tooth protruded through the floor of the antrum. I used a solution of four per cent. of boric acid in warm water to cleanse it, and then opened the cavity, which has been caused by the enlargement, in order to aid the exit of pus, which might be formed, by the force of the gravity, and continued this for three weeks, but did not find any change for the better, the patient complaining of much pain in the left upper cuspid, which tooth was in great decay, and there was a great deal of pericementitis. After extracting the tooth a great deal of pus was discharged, and after washing and cleansing it perfectly he found that there was the seat of the trouble. He continued the same treatment in the front chamber of the antrum, using the same solution of boric acid, and it worked a radical cure of the case. He at the same time treated the patient constitutionally with a preparation of iron. The speaker believed that constitutional treatment is absolutely necessary, either in syphilitic cases or scrofulous cases.

DR. WILSON closed by saying he did not think it necessary to say anything further, as no exceptions had been taken to his paper, but he was glad that Dr. Abbott emphasized the necessity of absolute cleanliness. He spoke of using warm water alone; I have not gone that far. I use medicinal agents sparingly in irrigating the antrum, and I was glad he emphasized that one thought. I am satisfied that over-treatment is a prevailing evil in the treatment of the antrum in many of our dental troubles.

The subject was then passed, and the first subject assigned for discussion was then taken up. The subject was, "Can Apical Pericementitis Occur in Connection with Roots which have been perfectly Sterilized and Filled; and if so, under what circumstances?"

DR. A. O. RAWLS, Lexington, Ky., opened the discussion, and said that to sterilize a tooth perfectly it was necessary to go beyond the ordinary root-canal clear through the cementum. The speaker did not believe that there was any anastomosis between the tubuli of the dentine and the stellate structure of the cementum. If you can fill the canal up to the extremity, then in all probability you have done all that is possible to do to prevent pericementitis. But is it

possible to do this? Unless it is done, disintegration will come some time or other unless the subject is very tolerant of these irritations. It should be completely desiccated and dried by means of a hot-air syringe and drying every tubuli, and then suddenly while it is desiccated apply some ethereal solution, as varnish, or something of that kind, and let it fly like a flash into these canals. It is the first shot that settles it. You want to get to the point next to the cementum first, and if you fail in that you have made a failure in protecting the dentine absolutely; then when you have put the substance into the canal you still have the question to contend with as to whether there is any substance there that is not compatible with health.

DR. WILSON said that there was one other cause of pericementitis after the root had been thoroughly sterilized and filled. When we examine the histological structure of a tooth, we find a very small portion of the apex that is all composed of cementum; that small portion has without any doubt a direct circulation with the pulp. The question need not come up whether there is a connection between the cementum and the dentine. If you will cut a tooth in two longitudinally you will find two or three lines at the end of the root that is all cementum: none of it dentine; that portion of the cementum connects directly with the pulp. Now, if we apply arsenic to the pulp of the tooth more than once we are in great danger of devitalizing the pulp, not only throughout the main body but down to the very apex of the root. We have then destroyed that part of the pulp that is in direct communication with the cementum, and thereby destroyed the vitality of the cementum at that point. It then becomes a foreign body. I always feel afraid when that is done that I have destroyed the life of this apical portion of the cementum, and that no matter how thoroughly the canal is sterilized and the tubuli and the canal filled, that there is still a little foreign substance at the end of the root, and it is in those cases I believe that we have so often an uneasy sensation at the end of the root of the tooth. A long period may elapse without any real pain, but there will probably be some subsequent trouble.

DR. E. M. S. FERNANDEZ, Chicago, Ill., thought the time would come when the use of poisons for devitalizing the pulps of the teeth would be abandoned, although he had not reached that point himself. Arsenic, he said, was a strong and unreliable poison, and very treacherous. Some say they do not use arsenic, but use cobalt, but it is the same or more dangerous in its metallic condition than arsenic. If we use it only once, we have no means of controlling it. I think some mechanical means should be adopted for devitalizing the

pulp. We give nitrous oxid gas, ether, and chloroform for the extraction of teeth, why not adopt that for destroying pulps? Having gotten everything ready and having administered the gas, run a drill right through the pulp to the beginning of the root-canal. We know of cases where orange-wood has been driven right through, and they are very successful. I have seen them filled by quacks and seen them decay, but still there was no pericementitis of any kind. It was simply due to the way of destroying the pulp. They used no poisons, but used the essential oils a great deal. I think the main cause of pericementitis is the poison used in destroying the pulp. You have the circulation destroyed when the poison gets there,—the capillary circulation is destroyed. The obstructed functions of those parts is, to me, where the trouble lies. In devitalizing a tooth he tried to devitalize the pulp itself only. After devitalization the pulp is desiccated by use of tannic acid solution in glycerol, if that did not desiccate it thoroughly and he found a part of the pulp left he digested them with a solution of pepsin, and by all means avoids the use of poisons any further than the body of the pulp. Before applying the poison he lacerated the pulp, then used a strong saturated solution of tannic acid in glycerol and closed it with oxyphosphate of zinc and allowed it to go eight or ten days, then bored a small opening to see if it was dry enough; and if so, drew it out, the three little white threads at the apex of the root sometimes coming out with it. He had been very successful with that kind of work.

The second assigned subject, "To what Extent is Interrupted Primary Dentition an Etiological Factor in the Diseases incident thereto, more especially Pulmonary, Digestive, and Intestinal Disorders," was passed, no one offering to discuss it.

The Section adjourned to meet Friday, at 2 P.M.

SECTION III.—CHEMISTRY AND METALLURGY.

This Section held no meeting.

SECTION IV.—THERAPEUTICS AND MATERIA MEDICA.

Dr. F. J. S. Gorgas in the chair.

Dr. Thomas Fillebrown, Boston, Mass., read a paper as follows:

A NEW APPARATUS FOR MAINTAINING ANESTHESIA WITHOUT A FACE-PIECE, AND WITH THE MOUTH OPEN.

The necessity of repeatedly re-anesthetizing the patient has always been a great and serious hindrance to the progress and success

of surgical operations within and about the mouth and throat. My own experience in operating upon the palate and lips led me to consider the possibility of maintaining the narcosis without interfering with the operation. I am pleased to announce the accomplishment of this object.

Several anesthetists have used etherized air, in inducing and continuing anesthesia. Clover used chloroform in this way many years ago, and later applied ether the same way. Messrs. Codman & Shurtleff, of Boston, produced an apparatus for this purpose some years ago.

The working of all of the inhaling instruments depended upon the force of the inspiration of the patient to draw the air through the ether, and all except Codman & Shurtleff's provided for the patient to expire back into the instrument.

About two years ago Dr. Horace Packard used a compressible bulb to force the air through the ether, and thus made a very great improvement over the old method, but this still allowed the respiration to pass back into the instrument. The observations of the workings of this inhaler led me to the conception of an apparatus to accomplish the much-desired object of anesthetizing without sponge, towel, or face-piece.

My apparatus consists of a bellows, connected by rubber tubing with the long tube of a twelve-ounce wash bottle, with a stop-cock intervening to regulate the flow of air. From the bottle extends a half-inch rubber tube to the patient. The bottle is filled one-third full of ether. The bellows is inflated and the stop-cock opened so as to allow the air to bubble up freely through the ether, and to become saturated with ether vapor. The etherized air is then discharged through the second tube a few inches from the patient's face.

This application of ether will maintain complete anesthesia for any length of time, and not interfere in the least with any operation in or about the mouth: nor will the surplus vapor discharged into the air, sensibly affect either the operator or the assistants.

I have maintained perfect anesthesia for half an hour in one case to one and one-half hour in another case, without intermitting the operation at all on account of the anesthesia. This method is not wasteful of ether, as less than one-half pound continued the narcosis the hour and a half; but the waste I should consider of no account as compared with the great advantage gained.

I have made a still further modification of the instrument, and adapted it to the induction of initial anesthesia, and its maintenance with face-piece for use in general surgery.

All ether inhalers now in use allow all the exhalations to be forced back into the instrument; consequently the patient breathes over and over again the same atmosphere and becomes more or less asphyxiated, instead of truly anesthetized. Such a plan seems to me unscientific, uncleanly, and unhealthy, in every way undesirable.

To avoid this condition, I have attached to the discharge-tube of the apparatus above described, a double-valve face-piece, such as is used for the administration of nitrous oxid, and a double-end gas bag, for a reservoir. By this means the patient is insured an abundance of pure anesthetic atmosphere for each inhalation.

At the suggestion of Dr. T. M. Dillingham, I first filled the bag with pure air, and by slowly injecting the etherized air, narcosis is induced with absolute freedom from any of the disagreeable symptoms usually experienced when etherization is accomplished.

I have since found that the same object is better accomplished by raising the tube in the bottle until it is entirely free from the ether, filling the bag, and commencing the inhalation. In this air there will be but a very little ether. Then gradually slide the tube down into the bottle, and as it approaches the ether the strength is increased; after one-fourth of a minute the patient can breathe the full strength.

If the mouth is to be operated on, when anesthesia is complete, disconnect the bag and face-piece and proceed as before described.

DISCUSSION.

DR. W. J. BARTON, Paris, Texas. I would like to ask Dr. Fillebrown if he could not dispense with the gas-bag, by having the administrator press the rubber tubing at the time the patient is exhaling, and allowing it to be open at the time the patient is inhaling.

DR. THOS. FILLEBROWN. I think it would not be quite as convenient, because you have to hold the whole pressure of the column of air, and it would require careful observation to watch the inspiration and expiration, while with this there is no watching at all.

DR. H. W. RAY, St. Joseph, Mich. Do you produce anesthesia quicker by your method than in the old?

DR. FILLEBROWN. I do not, but I produce it without any coughing, because you can control the strength of the vapor so perfectly, and there is very much less emesis results from it.

DR. C. R. TAYLOR, Streator, Ill. There are two or three difficulties I have found in giving general anesthetics with ether; there is the difficulty of coughing, in consequence of the large inhalation of ether at the start. I would suggest, if Dr. Fillebrown had a tipping bottle there, that would throw the tube so that it would not

strike the ether, it could be done all with the one hand instead of using two. I have found difficulty in getting the patient under absolute control, as you may have had with this, in the commencement of the administration of ether or any general anesthetic; you can get a more immediate and better effect by asking your patient to exhale and inhale several times before you give the anesthetic.

DR. FILLEBROWN. I think the most delicate way is to put the bag onto the bellows and fill it with pure air first, then proceed, and you will have something that is absolutely non-irritant.

DR. C. R. TAYLOR. Nervous patients are often frightened by the anesthetic, especially ether, because of its causing coughing.

DR. J. E. CRAVENS. I will say to the gentlemen that if they will have the anesthetic agent—chloroform, ether, or gas—inhaled through the nose, they will have none of the trouble they mention.

DR. W. J. MORRISON, Nashville, said that the ether would be very likely to damage the rubber tubing in a very short time. He had tried a similar arrangement to that exhibited by the essayist, the bottle being incased in a hot water bath made of a double tin cylinder, so that hot water can be put between the two cylinders and the bottle is set in that, in order to obviate the trouble of the destruction of the rubber. The mouth-piece is a little differently constructed, the face-piece being larger; and for the regulation of the air he placed in the face-piece a valve, and when commencing to anesthetize the patient he would gradually close that.

DR. FILLEBROWN showed to the last speaker the piece of rubber that had been in use some time, and that it was not damaged in the least; and even if it should become so, he thought he could afford a new set of tubes each time for the sake of the good results.

Dr. D. Caracatsanis then read a paper upon the treatment of pyorrhea alveolaris, which will be found on page 853 of the current number.

DISCUSSION.

DR. J. W. BARTON, Paris, Texas. There is one point I wish to impress. In cases of the third and fourth stage mentioned by the essayist, I would suggest that the teeth be maintained in a stationary condition, which is easily done in most cases by ligatures upon the adjoining teeth, properly adjusted, either of silk or gold binding-wire. It is very important to keep the teeth as immovable as possible during treatment.

DR. JAMES TRUMAN, Philadelphia. I cannot quite reconcile this treatment with my ideas of the disease. The gentleman, as I understand it, takes the position that he must scarify the gums. Now

what does he do that for? I would like that question answered. To my mind the gums are not the origin of that disease. What is its source? If I understand it, it originates in the pericementum. Pyogenic germs generate there and produce the irritation in the primary stages; as these progress necessarily the pocket deepens, and the gum is left almost intact. Now, why scarify the gums? Is it necessary to scarify anything? If the position I take be the correct one, that it is owing to the microbic influence in the pocket that this disease occurs, then the first thing to do is exactly what this gentleman did, use a powerful agent such as mercuric chlorid in the proper solution.

That is the beginning, then he applies iodine and aconite. Now, I cannot comprehend exactly what effect iodine and aconite will have for the checking of this pathological condition. Aconite, if I understand it, is to obtund the nerves more particularly; it paralyzes the nerves, and prevents by their action the influx of blood to a particular part. Iodine is simply an irritant when used in that position and as far as that goes it has its usefulness; but to my mind, while it may do good, it does not meet the conditions present. We want something more than this. The antiseptic that is used or may be used, whether it be mercuric chlorid, hydronaphthol, phenol, or any other agent, must necessarily be used continuously. I think the great mistake made by operators in this direction is that they do not meet the conditions for the future; they consider the case cured when they leave it after perhaps two or three to six weeks. But that is simply the beginning; if the patient is to be treated properly, it must be continued through the balance of the life of that patient. I never would allow a patient to go from my office and tell him the case was cured without giving him the proper remedies to use and proper antiseptics to keep the pathogenic germs from producing further decomposition in the future. Unless explained properly, the patient will only return in a few weeks with the case just as bad as in the beginning.

The real scientific data are still wanting in pyorrhea alveolaris. I am pleased with the paper so far as it goes; it meets some of the conditions, but does not meet them all, nor does it meet them in a way to treat pyorrhea satisfactory.

DR. CARACATSANIS replied to the speaker in the French language, stating that he would answer the question of the gentleman by saying he used the aconite and iodine to reduce the inflammation, as a counter-irritant.

DR. CRAVENS. A year ago I reported a case of pyorrhea alveolaris before the American Dental Association, in which I outlined

or indicated a practice perhaps entirely different from that which had obtained up to that time. I also stated I believed the case was cured, and that the patient had only had nine sittings, and that I treated and cured nineteen pockets in the same mouth. The patient has been South for about a year, and returned to my office just a few days ago to have his mouth examined, and there has not been a recurrence of the pyorrhea alveolaris in a single pocket that I treated. Some of the pockets extended down over the ends of the roots. One of the lower molars particularly, where the excavation extended between the roots, and a syringe placed upon the side discharged the water clear across his tongue. He had had no treatment while away, except about once a month or six weeks he would go to a dentist in a little country town near Nashville, and have him scrape off any external deposit of tartar on the inside of the gum. There was a bicuspid above, on the right side, that was, if anything, worse. It was the second bicuspid, and had a bifurcated root, a very unusual thing. It was a pretty bad case to clean out. When he returned, the first thing I did was to examine that tooth. I found the gum was closed about as tight as the attachment of the integument around the root of the nail of my finger.

In regard to my treatment. The surgical work must be done thoroughly. If you do not remove all of the calcareous deposit from the root of the tooth, either in pockets or scattered, the case will not get well. If you get all of that out and then follow the treatment I indicate to you, I can safely assure you that you will have resolution in every case. I have had from one to five cases of pyorrhea alveolaris almost every day, either in the first, second, or third stage, and I have not had a failure in the case of a single tooth or pocket that I have treated.

The first step is to scrape the root of the tooth. I do that after anesthetizing locally, so that it is possible to scrape the root painlessly; then I wash out the pocket with the hot water to get rid of everything that is loose in it. I then apply dilute sulfuric acid, one part of the sulfuric acid to ten parts of water, using the common commercial sulfuric acid. I apply it in two ways, with a syringe, or a common quill toothpick, a very useful thing where you wish to use sulfuric acid or nitrate of silver. It is very flexible, and is not affected by any of the acids you use. I want to fill the pocket with this sulfuric acid, that is all; if it escapes in the mouth it will do no harm beyond perhaps etching the teeth a little bit.

That is the end of the first sitting. The sulfuric acid will occasion pain in applying it in that way, but if the operation of scraping has not been very long, you will find that the effect of the

cocain will hold over, so that the sulfuric acid will not occasion any pain. I don't care about the strength you use, but if you think the effect of the cocain has subsided sufficiently to allow the patient to feel the effect of the acid, apply the cocain again.

The second sitting is not a surgical one; the first one should complete the surgical part. I begin with the hot water, and thoroughly wash the pockets as many as four or five times with an ordinary plunger syringe, forcing it in with just as strong a pressure as I can make; then I follow with a ten per cent. solution of nitrate of silver. That solution is not caustic, because you cannot get the pockets totally dry. You leave some of the water there so that when you put your silver solution in it is instantly diluted.

I use just enough to fill the pockets, because if you have an excess, and there are any gold fillings in the mouth, it will discolor them; or if you use a great deal, you might very seriously injure the surface of the teeth. One application of the nitrate of silver ought to be sufficient. Then I discharge the patient without any further treatment at that sitting. For the third I usually allow four days between each sitting, though the period might be increased to six. I wash out with the hot water, and for the nitrate of silver I substitute bromo-chloralum, which you can purchase at any drug-store; I believe it is used for a general disinfectant, embalming fluid, and all sorts of things. It is a powerful astringent. I use it with the full strength and in the same way, either with a syringe or with a quill.

There should be but three sittings. If there is pus evident at the third sitting, you will have to scrape the tooth again, because you have not done it properly in the beginning. But if it is done properly there will be no pus after the first sitting. I then have the patients come once or twice every one, two, or three weeks, to have the pockets washed out with hot water, and give them a douche of the bromo-chloralum that is diluted perhaps one to five or six, and I take occasion to examine the case to see if it is all right; but there has been no case in which there was a recurrence of pus.

DR. W. J. BARTON, Paris, Texas. I think it requires proof to make such statements go down. I want to say that the absolute similarity of the treatment is not so important, so that the surgical operation is thorough, so that the treatment is thoroughly antiseptic and cleansing, and the pockets are kept cleansed for the time. That is a very excellent mode of treatment; I like it very much. I have had in my practice cases of seemingly successful cure, and I proceeded in about the same course of treatment. I have in my mind a case which I treated more than a year since, in which there

were some very bad pockets. I have had that patient in my office in the last six months, and in the last month before coming here, and carefully examined the case with other dentists to whose attention I called the case. There was an absolute union in that case, and the cure was so perfect in those particular pockets that in the same mouth there occurred other slight pockets, but at this particular place no recurrence whatsoever of the pus was noticed, so that I also can bear testimony to the fact that a certain cure in many cases is possible under right treatment.

DR. HARROUN, Toledo, O. When I noticed Dr. Cravens's system of treatment recommended, I had in process of treatment a very woeful case, where it seemed as though I should lose the teeth, in spite of all I could do. I had removed the third molars of the superior maxilla, which were entirely useless. The second superior molars and the second inferior right molar were very loose; the balance of teeth were firm and solid, no signs of disease upon them anywhere. The other teeth I mentioned were very loose and badly diseased. I could run my instrument through under the upper molar all about the roots, clear down to the points, and could move the tooth in any direction. I had gone through the surgical operation, so I was pretty sure that there were no calcific deposits there that I could reach. I became discouraged, and taking up my books I ran across Dr. Cravens's method, which I tried with entire success in this case, and I desire to state that the method was successful as claimed by Dr. Cravens.

DR. HART, California. The treatment I have pursued has been very simple. I take it for granted the disease is a disease of the periosteum of the tooth, and the periosteum is dead so far as the disease has advanced. It will go almost to the apex of the tooth, and perhaps three-quarters of the way around.

I begin with a treatment of bichlorid of chinoidin. I only use this once, and the next time my patient comes I make a band of No. 60 gold, that goes clear down underneath the gum as far as the pocket has gone, and put it on, encircling the tooth on the other side also, and cement that firmly in position, and I have the best kind of success. The disease seemed to stop after passing that band of pure gold underneath the gum, of course removing all calculus that might be present, but sometimes there is not any.

To allay inflammation I use euophen in a saturated solution in campho-phenique. I use a mouth-wash of hydronaphthol, and it is a splendid mouth-wash.

DR. A. O. RAWLS, Lexington, Ky. I expect that I have grown to be somewhat of an old story in regard to this subject; yet I can

see from the drift of the arguments that every one has not got onto the real merits of this trouble yet. I have contended that this was only a local disease.

I have contended all along that it cannot occur in some constitutions, while in others there is no stopping it. I claim that the tissues about the tooth are made susceptible to influences that it is impossible to cure after certain conditions prevail to start the wasting away and the loss of these tissues; that there is no reproduction, of course, upon dead tissue. We will do well if we can stop this melting away of the membrane that lines the socket and invests the root of the tooth aside from causing reproduction. I claim that the original cause of this condition is either inherited or acquired, and a result of the use of mercury. Very often inherited, too, from two to three generations. All you can do by your treatment is to arrest it for the time being. There is no special medication that is better than a perfect surgical operation, but I apprehend the majority of surgical operations in these cases do not go far enough; they only reach the root of the tooth. In most of these operations you are compelled to go beyond the root of the tooth. The process, as a rule, is broken down, the membrane is entirely swept away, and unless you reach the farthest limit you will have no cure. As to the treatment once or twice being successful in all cases, I do not think it is so. I don't think any one medication or substance or two or three treatments will cause a successful issue in all cases. Very often cases which are called typical cases of pyorrhea you will often find are nothing in the world but the result of uncleanness and negligence, and the accumulation of tartar around the teeth.

DR. TAYLOR. I should say from this diversity of opinion that there were two kinds of pyorrhea alveolaris; the one we meet in the office, and the one we meet in conventions. The ones we meet in conventions are very easily treated, but those we have to deal with in practice are very difficult, and cause us much trouble and tribulation.

DR. J. Y. CRAWFORD, Nashville, Tenn. We have one distinguished member of the dental profession in this country who has made a statement in reference to this condition and its management, and I regard that statement as sufficient to settle at once the character of this disease: that it is a local manifestation depending upon constitutional conditions in some cases and local conditions in others. This gentleman made the statement that it was a self-evident disease; that he challenged the world to find a single solitary case that did not get well when the teeth are all taken out.

That was Dr. H. W. Morgan, of Nashville, Tenn., and to my mind it was the most philosophic expression I have ever heard made upon the subject.

Now, I want to say in the treatment of this disease, as in other forms of diseases of the mouth, two wrongs have existed; one is that in the management of them too vigorous surgery is in many cases applied, and another is too much medication.

In the treatment of wounds superinduced in the operative treatment of pyorrhea alveolaris, no medicine should be used except to meet the indications that may arise. When you get the parts in a condition of improvement and comfort, let it alone and keep it away from any and all medicine. There is no use to put anything in the cavity whatever, if comfort obtains and the process of restoration is established. Take, for instance, the antrum of Highmore, that may be invaded as the result of pyorrhea alveolaris; take a cavity like that, that becomes obstructed, inflamed, or diseased; open it, and when you get the effect of your treatment, and a condition of comfort established, with no necrosis, with no sloughing or denuding of the covering-membrane of it, let it alone unless some condition arises that demands attention; and so in other cavities of the body. What medicines you do use let them be intelligently selected; don't put in a septic cavity or during the septic condition a counter-irritant.

DR. CRAVENS, in reply to the preceding speakers, said that the best refutation he could make would be to invite the gentlemen to come to his office and make an inspection of the cases referred to.

DR. HOFF, Ann Arbor, Mich. I do not believe that this disease is always or that it is often of local origin. I believe that it is systemic, and I think that you will find in these very bad cases of pyorrhea alveolaris, that all the patients are troubled with diseases especially of the eliminating organs of the body, the kidneys, the liver, and so on. I first had my attention called to this in connection with the treatment of a patient who had been confined to the desk in an office for some thirty or more years, and his teeth were in this condition; he suffered also from this constitutional complaint, as I afterwards found out, but which I did not know at the time. I treated that man's teeth for several years. I treated them with all the approved methods and substantially the method that Dr. Cravens advocates, and he made no progress. I could retard the progress of the disease, but I could not make any progress toward a cure until my patient gave up his business and went to the South and bought an orange-grove in Florida, and living and working out in the open air a great deal during the winter, and when he came home the fol-

lowing summer I saw him again, and expecting that he had lost all his teeth, I was astounded at the conditions that I saw. When he left the teeth were loose and sore to the touch, but at this time the inflammation was gone from the gums, there was no soreness at all, and he could readily eat on his teeth. Of course the gums had receded, the process had been dissolved and had not been restored, but the other symptoms had disappeared, and I learned that he had had no attention or treatment for his teeth while he had been absent.

I think where we make the mistake is, in not taking into consideration the systemic condition of the patient; and I think when we get fully to understand this disease we will find it has a closer relation to the system and disturbances of the body than we now realize.

DR. CRAVENS. Suppose the case of a gentleman sixty-nine years of age affected with paresis so that he goes along sliding his feet, so that he is nervous and jerky in his motion; furthermore, had been suffering for a year and expected to die almost any time with Bright's disease. Would you consider that a favorable case?

DR. HOFF. I would consider that a very unfavorable case.

DR. CRAVENS. I have had a case of that kind and treated it, and have not been able to find a particle of pus since.

DR. HOFF. You may have done that. It is not a difficult matter to destroy the pyogenic membrane. The treatment you recommend is a detergent treatment, or rather the escharotic effect of your sulfuric acid is a detergent measure, it is not a curative. The only curative agent you employ at all was the nitrate of silver, which in the solution you use is a stimulant, not escharotic. Used in that strength, it stimulates the circulation in the tissues and in that way helps the condition.

DR. CRAVENS. We can't cure anything by medicine; we are simply putting the system in condition.

DR. HOFF. We do not try to cure these. In the local treatments you prescribe certain formulas for every condition, but I do not believe they will work. I do not think we can make a specific that will act upon this disease in all cases, because there are different conditions which will keep it active, in spite of all the medicines that you may use.

DR. F. KILLMER, St. Catharines, Ont. I have had some experience in the treatment of this disease, and I very much favor the treatment given by the worthy secretary. I regard to the causes, I would say that they are local and constitutional, but I think that the active agency in producing the disease in the first place is always a local irritant, and that local irritant may cause this disease to pro-

gress more rapidly by certain conditions of the constitution. Where a low state of vitality exists, as in strumous habits, the constitution is in such a condition the teeth may at once set up this disease. A gentleman here said he would like to know the cause of the disease progressing down the side of the root. Now, I thought the peridental membrane for the most part runs lengthwise of the root of the tooth, and any local irritation will cause inflammation ; and you all know the process is a softening one, the fibers will assume an embryonic condition and the cells will remain side by side, perhaps still connecting with each other. The mouth is thoroughly infested with micro-organisms, and when you have this condition of the mouth you have at once a state where these micro-organisms can develop rapidly ; and if they develop, they insinuate those diseased cells, they follow the line of the membrane, and for that reason they will continue right down to the root of the tooth towards the apex, and you will find it extends to the apex of the tooth before it extends laterally around the tooth.

If there is anything in this theory I advanced that the development of this disease follows the length of the fibers at the root, and that these fibers are excited by the local irritant until inflamed, then the first treatment should be to render that cavity thoroughly aseptic and remove all irritants.

It is a very essential thing that the pockets should have every particle of foreign substance thoroughly eliminated, and before doing this it has been my habit to use some antiseptic to render then thoroughly aseptic before commencing the process of removing the dead process or the little pieces of calcic material and tartar which accumulate in the pus-pockets around the roots of the teeth. If this treatment is thorough I think the case will be cured. I have not had universal success, but I have had great success in treating this disease where the peridental membrane had been destroyed at the apex of the root. I never have been able to get the gum-margin to reattach. I usually scarify the gum where there is very much destruction of the alveolar process; I cut the gum down freely, and of course as the gum comes together it will leave a notch at the edge of the root, but it will attach firmly.

I would like to emphasize the direction given by several here, to use sulfuric acid and nitrate of silver. I have gone so far as to apply in my first treatment with a goose-quill, a solution that is caustic in its effect. My theory is that in a low state of inflammation you require a strong caustic to produce stimulation.

DR. J. B. BELL, of Cleveland, O., advocated the practice of scarifying the gums, by which means the loose tissue is drawn up around

the cervical periphery of the tooth and produces an eschar. Acute inflammation must be established before you can get complete union at that point.

DR. CATCHING spoke of his method of treating cases of pyorrhea in which the cause was determined to be injurious food, in which the treatment advocated by Dr. Cravens did not seem to be the proper one. In most cases where the disease becomes chronic, the diet of the patient should be looked after in remedying and correcting the cause of the trouble.

The paper of Dr. Poinsoot, of Paris, France, upon the subject of the "Extraction of the Pulps of Teeth in a Calcified State by Trepanning," was read by the chairman, and is as follows:

EXTRACTION OF THE PULPS FROM TEETH IN A CALCIFIED STATE
BY TREPANNING.

In order to delay the senile loss of the dental organs, we have had recourse to the two following means of operation, which is very distinct from any other. Physiology teaches us that the tooth receives its nourishment from two different sources. The external life of the tooth, through the peridental ligament, and the internal life through the dental pulp, the function of which consists in securing the calcification of the organ in the internal part of the periphery, diminishing the pulp-chamber in a progressive way.

This calcification becomes generally complete about the age of thirty-five or forty years.

Pathologically speaking, a tooth can become damaged at a less advanced age, under the action of general or local causes, and also from dietetic causes, simply by the localization of acids resulting from injurious food which will collect locally upon a single point of the face of the tooth.

The results produced by our trepanation around the pulp, show how to suppress a mode of nutrition which has become useless which should it have continued to progress would infallibly have brought a case of anticipated senility favoring the loss of the tooth.

The two ways of nutrition, external and internal, must progress simultaneously until the calcification of the tooth is complete, and once fully completed, one ought to suppress it, in order that it shall not hinder the function of the other one. When one of the functions ceases to be a physiological one, it becomes fatally pathological, constituting in this way a real danger. It is therefore necessary to assure the integrity of the first function by suppressing the second which has become harmful, and so preventing in this way a reaction upon the point that we desire to preserve physiologically.

Some general causes may produce delays in the dental calcification. The troubles of nutrition from lack of proper food, may cause a delay; also trouble of nutrition caused from exaggerated quantity of food would be a cause which would precipitate the normal calcification. Some local causes may affect one or more contiguous teeth, or those at different points of the mouth. Sometimes, but rarely, however, one can notice in a mouth where the teeth are above the average of calcification, one or more teeth calcified in an exaggerated way. No matter what the cause may be, either local or general, when once the calcification is complete and fully and duly constituted, in spite of the semeiological interest, it would be advantageous to perform our operation, by trepanning the crown of the tooth through the axis of the central pulp-chamber. With a small drill to perforate the teeth which have a single root, and a larger one for teeth which have more than one root, carefully removing the enamel at the spot where the drill acts, best done by the use of drills made from small chips of diamond, which would act rapidly on the surface of the tooth.

The way to extract the dental pulp with the muscular fillet is by the use of the nerve-broach, which is used after obtunding the tissue with the cocain phenate, or if the root-canal is mechanically inaccessible by the use of the electro-cautery. Finally by filling the canal, or canals, the pulp-chamber and the trepanned part of the crown by any of the different methods of filling as commonly used. It is in these cavities, perfectly cylindrical in shape, that one can employ as a means of closure, small pegs of compressed wood, and this wood must be antiseptised.

In order to realize the most complete result, one ought to practice the operation before the pathological state of the tooth is very advanced. In fact, if one waits till the inflammation succeeding the irritation of the pulp has become chronic to the point of damaging the peridental ligament, with the gathering of cement and tartar which become injurious and bring about alveolar alteration, if one waits to allow the tooth to reach such a state, the operation of trepanning will infallibly prove useless, if not dangerous, as the tissue being injured, cannot stand similar transformation. In such a case it will be necessary to employ the process of resection between the alveolaris adopted by Messrs. Martin and Poinot, or even by the replacing method recognized by Messrs. Magitot, David, Castinel, etc.

Our mode of operating is also indicated when the gum, independent, or following the peridental ligament, surrounds and encasps the crown of the tooth when the calcification is complete.

If the typical condition be a little modified by pathological state, it can be discovered in its primitive stage by a careful examination, or by the electric light, permitting the examination of the dental tissue through its transparency.

The meeting then adjourned, to meet at 2.30 P.M., Friday.

SECTION V.—DENTAL AND ORAL SURGERY.

Dr. Brophy in the chair.

A paper was read by Dr. Louis Ottofy, Chicago, as follows :

HISTORY AND THE PRESENT STATUS OF THE TRANSPLANTATION OF DENTAL TISSUES.

The transplantation of dental tissues in the oral cavity is practically confined to the teeth themselves, and hence this paper will treat of that subject alone. Transplantation of teeth has been practiced for several centuries; it has, however, remained for those of the latter part of the nineteenth century to devise scientific means for the proper performance of these operations.

It seems almost impossible that successful transplantation could have been practiced without antiseptic precautions.

In transplantation, we include the subject of implantation.

John Hunter is credited with the introduction of the subject of tooth-transplantation, and his claim to the distinction has never been questioned. So far as the subject of implantation is concerned, I desire, without authoritatively placing the credit to any one, to quote the following from dental literature :

In Vol. XXI, No. IV, October, 1881, of the *Deutsche Vierteljahrsschrift für Zahnheilkunde*, pp. 417-419, occurs the following in the report of discussions before the Central Association of Dentists held at Heidelberg, August 2, 1881:

Question 1 is as follows: Are there positive indications for the replantation of teeth?

"M. WITZEL. Gentlemen, before endeavoring to reply to that question I wish to submit to your examination several casts. They are two casts of a lady's teeth. She is fifty years of age, and in her case I *replanted* an incisor which had been diseased, and *implanted* a *dead incisor*. After a careful examination of the clear and distinct casts you will be unable to distinguish which is the trans and which the implanted member. The arch, as shown by the casts, is normal and possesses healthy alveoli, whose prominences are plainly distinguished, and by which it may be seen that the dead tooth is also firmly attached. The gums surround the teeth alike, and the results

of the operation are such *that dentists who have seen the patient could not distinguish the implanted dead tooth from the living ones*. Such results again lead to the question: Are there positive indications for the replantation of teeth? M. Herbst has materially simplified the treatment of replanted teeth by the introduction of his very useful rubber-dam ligature, and I believe that the question of *tooth-implantation*, which was first scientifically observed by Dr. Mitscherlich, is now again open for discussion.

"The most disagreeable procedure in the treatment of implanted (or transplanted, *as Mitscherlich designates the implantation of dead teeth*) is the use of the *gutta-percha shield* recommended by him, and which the patient is obliged to wear for from four to six weeks, thus covering and protecting the implanted tooth. This covering, under which the gums and soft tissues usually become inflamed, is made useless by the one recommended by M. Herbst. It does not interfere with the patient and need be worn but eight days, for by that time, if the operation proves successful at all, there will be sufficient attachment formed by the gums to retain the tooth in position. A further advantage of this bandage is found in the fact that the patient is enabled to cleanse the surfaces covered by the rubber-dam with a camel's-hair brush dipped in alcohol, hence the chances for success are materially increased, as the inflammation which almost invariably follows the use of the gutta-percha shield is entirely obviated. . . . M. Sauer . . . does not believe the transplantation of dried teeth rational. The speaker mentions a case of transplantation occurring in his own practice, in which he replaced a lower right molar by an upper bicuspid. As the molar had been missing for some time, M. Sauer was obliged to make a new alveolus with the use of the dental engine (certainly a heroic undertaking, *German Editor*) and in this the tooth was fastened. The tooth apparently became firm; the patient, a young medical student, exhibited it freely. The frequent ocular and manual examinations to ascertain the nature and extent of the attachment finally caused the tooth to drop out."

Dr. Bogue, of New York City, in 1885 said: "I was also informed in Paris, two years ago last winter, that a certain gentleman several years previously had gone so far as to implant teeth into sockets artificially prepared by himself, which teeth had been taken from a patient in an adjoining room; that those teeth were deprived of their pulps, the roots filled, the teeth and sockets antiseptitized, and every precaution known to modern dental science observed; that the teeth became firm, remained so for over a year, and then gradually loosened from absorption of the roots, and at

the end of two years there remained but one of all that were implanted."

As is well known, it was some years subsequent to this that Dr. Wm. J. Younger, of San Francisco, Cal., re-introduced the subject to the profession of the United States. So that here too we have, if you please, the Vikings followed by Columbus. To whom credit and in what measure it is due is for you gentlemen to say. So much for history.

Regarding the present status of the subject I have but a few words to say. The operation has received but limited recognition in the permanent literature of the last few years, and reference to it is made more in the spirit, as if the operation were merely a curious experimental novelty. My observation and experience in implantation leads me to express the following statements:

1. Implantation has been practiced for a sufficiently long period to entitle it to be accepted as a legitimate operation in oral surgery, in regard to which the dental surgeon should have the privilege to perform, assuming the attendant risks as he is doing in other operations. This statement is made as the result of observations extending over a period of nearly eight years.

2. That in view of the fact that all dental operations are more or less of a transitory character, implantation deserves to be classed as a permanent operation in the same sense in which other operations performed by dentists are considered permanent, and that it should not be considered merely a fanciful experiment.

3. That no operation of the dentist so nearly reproduces nature as that of an implanted tooth, and the result, when successful, in appearance and comfort cannot be excelled by any other operation within the domain of the entire science of dentistry.

4. That the operation should not be performed in any cases, except those which have been as carefully selected as they would be and as they are for other operations.

It is not within the province of this paper to describe the modes of operation and the various details, but to have the subject considered by this representative international body in order that this branch of oral surgery may receive its proper recognition.

DISCUSSION.

DR. LESTER: Some years ago, at the Southern Dental Association, I had a tooth implanted that did good service for two and a half years, and if I had been careful of the tooth it might have been serviceable to-day. I was constantly biting hard substances to test it, and at the end of the time stated the tooth loosened, and was lost as temporary teeth are. A year or so afterward, Dr. Linden im-

planted another tooth in the same place, but it formed no attachments. In drilling into the jaw, he made a large socket, and his tooth came out, as you would naturally suppose, and the socket filled up with new bone, which was not as solid as the original bone. I presume that the drilling into the newly-formed bone caused an irritation, and consequently no attachment formed. I have myself implanted quite a number of teeth, and if it was not for the absorption of the root of the tooth implanted, the operation would be, in my opinion, a success in many cases. Many patients desire the operation if they can be assured of success. The tendency of loss by absorption of the root is so great, that unless it can be overcome I think there is no future for implantations. This case of which I spoke was a superior second bicuspid.

DR. GODON. I made a transplantation of the first superior bicuspid, and when the tooth was placed in the socket it was loose. I fixed it by a splint and it remained, and I presented the case to the society in France. This remained in place about eighteen months. I had no inflammation or suppuration, and the tooth remains solid. I have made many transplantations, the same as Dr. Ottofy describes. I only transplant bicuspids, because we have no front teeth to transplant.

DR. CARROLL. This subject is one of great interest to me, by virtue of its being a bold attempt by a bold, talented man to do a great service for humanity. I have watched the operations since they were first announced, and many of them have been very beautiful; but what I am trying to get at now is, what is the consensus of this little body of men here to-day, as to the usefulness of these implantations.

DR. YOUNGER. I have a cast which I wish to show you. (The doctor here exhibited several casts showing conditions existing before implantation, and the results accomplished.) I recently heard from a lady in Paris for whom I implanted five teeth, four bicuspids and one molar, over eight years ago, and she reports they are now perfect. Also another case of her son, over five years ago, and in each case no one would know from examination but what they were teeth that were indigenous to the mouth.

DR. AGUILAR. I would like to ask if Dr. Younger uses ligatures to hold the teeth in place.

DR. YOUNGER. Strings, principally; occasionally a small gold plate.

DR. BARRETT. In implanting teeth where there is an absorption of the alveolus, do you get a development of the alveolus around the tooth when it was outside?

DR. YOUNGER. Yes, sir, it is done within two or three months. So we have a deposit of the alveolus, the same as where the tooth had grown in the first place.

DR. AGUILAR. If I am not mistaken, Dr. Younger attributes the attachment of the implanted tooth to a dormant vitality that exists in the tooth. I would ask whether that dormant vitality will continue, and how long it will remain.

DR. YOUNGER. I have used teeth that were eight years of age, but I prefer to use them fresher. I was asked to use upon one occasion the tooth of a mummy, but I did not wish to do it, fearing it would hold the profession up to ridicule. I said I would implant that tooth, while I had no confidence in its remaining, and I did it, to find out whether there was any possibility of its being retained. After ten days, the tooth slipped out because it had no vitality. Last year I showed two cases in Brooklyn, one where a tooth had been implanted, and kept it in five weeks, and the gentleman came in for whom I had transplanted teeth before. I planted a bicuspid that had not a particle of pericementum. Half an hour afterwards, the patient came back with the tooth in his hand. I immediately sent for this gentleman who was going abroad, and showed him the result. In those two cases I implanted two teeth that were well covered with pericementum, and in four days there was attachment, and in five weeks they were perfectly sound, and remain so to this time. I do not understand how gentlemen can say it is as well not to have the pericementum.

The question was asked, does the pericementum become rejuvenated?

DR. YOUNGER. The cicatricial tissue forms a pericementum around the tooth.

The question was asked, What has been the condition of the pericementum upon extractions where they have been failures?

DR. YOUNGER. One case I reported, I had implanted in Dr. Kingsley's office, in a lady, and next morning I discovered a fissure, and so I removed the tooth, after being in only one night, and I laid it by; and three years afterward a gentleman came in from San Francisco, who had lost three teeth during the war by the explosion of a cannon, and this tooth was the only one I had to match his. The patient said he did not care for the beauty, but for the utility of the tooth. So I implanted those three teeth, and about two and a half years after that the tooth split. One portion was firmly fixed in the alveolus, and the other was loose, and yet gave him pain when he tried to pull it off. I tied the teeth together, and tried to get the

rest of that tooth out, and, knowing how hard they are to get out, I took a very high hold, and extracted the portion that had become attached, and that portion seemed to be perfectly covered with healthy pericementum. I immediately put it in cold water, and sent for Dr. Jacobs, who was recommended to me. He had read a paper before the local society, saying there could not possibly be any vitality in the tooth after it had been extracted, and I thought I had rather have it in the hands of an enemy than a friend, so I sent for him, and he said, "If that is what it seems to be, I will have to chew my words." He came back and said that he had found it to be pericementum, and that the tissues underneath were healthy tissues.

DR. BENTLEY. How do you account for the absorption of some of these roots?

DR. YOUNGER. I only know they do absorb.

DR. OTTOFY. In reply to Dr. Godon, he said he confined transplantation of teeth to bicuspid, because no other good teeth are available. We can use the roots of teeth and attach an artificial crown. It is very seldom that a tooth will remain intact unless it is kept moist, so recently when not having the opportunity to get good teeth, I have placed a crown upon a natural root.

In regard to the question asked by Dr. Barrett about the formation of new bone where teeth had been transplanted, I am very much in doubt about that having taken place, but it does seem from examination that new bone has been formed. We generally cut the gum so there is an amount of gum that afterwards absorbs and leaves the root in proper form. I believe they are not generally entirely covered with bone. They may be two-thirds of the way, but not clear around.

DR. YOUNGER. In answer to Dr. Barrett, I make undercuts in the gum, and bring it to the front.

DR. AGUILAR. If I am not mistaken, Dr. Younger recommends to sterilize the tooth to be implanted, in bichlorid of mercury. After sterilizing in that way, do you think that dormant vitality still exists?

DR. YOUNGER. Yes, I think it will. I do not use as strong a solution as formerly, and you must remember there is a tissue life as well as bacterial life. The beef you eat is not dead, for if it was you could not eat it. The German theory was so strong, that now I use only half the strength of the solution that I formerly used for sterilizing. I calculate upon about twenty per cent. of unsuccessful implantations. The first operations of which I took a record were thirty-six, and out of those I am not able to find any more than nine that have been failures, and those have been in eight or more years.

DR. BARRETT. When this operation was first proposed, with my usual impetuosity I pronounced it unsurgical and unphysiological. I have learned something since that time, I trust, but I cannot give my consent to the theory of Dr. Younger, as to the persistence of life in the pericementum, for it seems to me to be unphysiological; but that he succeeds, and that there is a pericementum around the tooth afterwards, cannot be denied, though I cannot believe there is a persistence in its life. Why should life continue in that any more than in any other analogous tissue? We know this, that where we supposed formerly that bone and tooth-tissue was always due to the pericementum, we now find that it is not so. We find interspersed throughout the tissue of the bone, the osteoblast, and wherever that osteoblast exists, there may be a reproduction of the bone-tissue. Now he makes in his operation an artificial cavity in the bone itself. What is the consequence? The reproduction of periosteum or pericementum. I conceive that there is a reproduction of periosteum or pericementum, but that there shall be any persistence of life of the periosteum after the tooth has been entirely desiccated seems to be utterly impossible.

We are all under great obligations to Dr. Younger for the persistency with which he has urged this, until it has, as I believe, come to be an established system of practice. It has come to stay, and it is not a matter of experiment hereafter. That teeth are occasionally lost is a matter of course, but do you never make a second plate? If a tooth is lost, as it occasionally will be through some malnutrition of the system, implant another just as you would put in another artificial tooth. It is not a failure of the operation, either from a surgical or physiological standpoint. We had an exhibition of this same thing here yesterday, where a member objected to the use of a surgical operation because it could not be used upon every occasion.

DR. J. M. WHITNEY, of Hawaii. I had the great pleasure of becoming acquainted with Dr. Younger, in his early trials of this system, and was very much impressed in seeing him operate upon this third or fourth case. I went home and commenced this practice six or seven years ago. Just before I left Honolulu, a lady on whom I had performed one of my first operations of a bicuspid, came into my office, and I thought she had lost some of her friends. She said, "Doctor, something has happened to that tooth." I looked at it, and saw it had been split from top to bottom. In attempting to remove the split portion, I found it very firmly attached—as any live tooth I had ever found that had been split off from a section of the tooth. I attempted to extract it with my fingers, but could not. I then drew a thread around it, and afterwards a ferrule,

and it remains there to-day. Now the question is, what held that? Was it a living connection? I examined it, and could not see that there was any difference between that and any other living tooth that I had ever examined.

DR. YOUNGER. I think there is no proof of vitality like sensation. I have known of an implanted tooth upon which was a little tartar, and on touching it found it hurt. So I pretended to touch another tooth, and put the point on that same one, and that tooth was as sensitive as any other tooth that had been grown in the patient's mouth. I called my brother and another gentleman as witnesses to the fact. They were astonished.

DR. BARRETT. I can readily conceive of there being sensibility of the tooth, or reproduction of the pericementum. The persistence of life is true as regards vegetable life, but not true as regards animal tissues.

DR. PARSONS. It was my pleasure last June to spend the greater part of a week in Dr. Younger's office, and I must have seen as many as five cases of these implantations. I had ample opportunity to examine those cases thoroughly, and the effects in every instance were beautiful, and to all appearances were lasting.

DR. BROPHY. There is another subject for discussion before the meeting, but with the consent of those present I will ask Dr. Younger to explain his method of using ligatures, and the process by which he moves the teeth and obtains such results as we see upon these casts.

DR. YOUNGER then explained his method of using ligatures, after which the Section adjourned to meet Friday, August 18, at 2.30 P.M.

SECTION VI.—OPERATIVE DENTISTRY.

The meeting was called to order at 2.30 P.M., by Dr. Jarvis.

Dr. Caracatsanis, Athens, Greece, read a paper in French on "The Treatment of Dental Caries in the Second, Third and Fourth Degrees." A translation of this paper was read by the secretary. The paper will be found on page 875. No discussion followed this paper, and the subject was passed.

Dr. Geo. W. Whitefield, of Evanston, Ill., read a paper on "Soft Gold and Galvanic Action between Gold and the Baser Metals." After reading this paper, Dr. Whitefield demonstrated the galvanic action which takes place between gold and amalgam by the use of a galvanometer. The paper of Dr. Whitefield follows:

SOFT TEETH AND GALVANIC ACTION BETWEEN GOLD AND BASER METALS.

As the violence necessary for the insertion of gold plugs in soft teeth will break down or more or less damage the walls of the cavity, dependent on the care of the operator and the preparation of the gold foil used, gold is not our ideal filling-material in such cavities. Amalgam shrinks from cavity-walls when it is placed there to protect them, and permits moisture to enter; it stains the walls of the cavity, and permeates the structure of soft teeth until the gums recede from contact with the poisoned tissue. Roots filled with amalgam in time will show signs of exfoliation; this latter fact is probably due to the chemical or galvanic action.

[The paper then entered into a discussion of electricity, its forms, methods of production, and modes of action.]

A battery may be formed by dissimilar metals in the mouth, where the fluids of the mouth are the exciting media, in which gold will be the negative (—) element, as the fluids of the mouth have no action on this metal. The positive (+) element is the basic metals, whether used separately, as tin, or, as most commonly, the combination of mercury with tin, silver, zinc and copper, as in the amalgams in use.

With gold and tin to form the voltaic pair, the base metal soon becomes coated and the current practically ceases, but, with amalgam, the mercury performs the same office in the mouth that it does in the laboratory; it presents the metal in a form that is easily acted upon by the exciting fluid.

We always have good conductors in the fluids of the mouth, containing, as they do, mucus and various earthy salts, while often the fillings touch in the same tooth, or, approximately, as fillings of gold in one tooth and amalgam in another.

The action will vary according as the conditions are changed; naturally where food is left between the teeth to decompose, the acid resulting from such fermentation will form a more exciting media than normal alkaline saliva. Where a filling is left rough and jagged, overhanging and irritating the gums, it presents an exaggerated surface to be acted upon, besides, by irritating the gums, it causes a secretion from them that forms an excellent exciting fluid. This is unfortunately the too frequent result of careless operating.

The writer had demonstrated "that a current was generated by amalgam and gold fillings when placed in water, even when they were insulated from each other, by bringing a galvanometer into circuit."

If gold and amalgam touch in the same tooth there is practically

less destruction around the gold filling. The galvanic action is so violent that the surface of the amalgam filling is soon destroyed; that is, all the baser metals are consumed from the face of the plug, leaving the silver, gold, or platinum of which it is composed on the surface, which practically changes the amalgam to nearly a silver surface, thus raising it to nearly a negative metal, while, besides this, the coating protects even the surface of the silver. With regard to very old plugs of amalgam, their surface is no longer amalgam, it is negative metal.

Galvanic action has a tendency to accelerate the blood-flow, producing hyperemia and hyperesthesia, and in some cases violent nervous phenomena. This is especially the case where, from the situation of the fillings, the energy is accumulated, then suddenly discharged, producing shock, as anyone can demonstrate by touching a bit of zinc or a blade of a penknife to a filling in his own tooth. The benefit attributed to the use of amalgam as a filling-material is probably due largely to moderate action of this kind, producing a hardening effect by increasing the circulation in the vessels of the pulp.

The current is generated from all parts of the elements that come in contact with moisture, and are not protected by a coating. The portion of the amalgam filling protected by tooth-structure becomes so coated that there is practically no action except on its exposed surface; on the contrary, gold remains bright on all its surfaces, and as moisture pervades the whole tooth, no matter how well the filling is inserted, moisture will reach it by way of the intertubular spaces, consequently electrolytic action can take place from all portions of the gold element, naturally causing considerable destruction around the gold filling. But a small amount of E. M. F. is required to produce great results in electrolytic action. The dynamos employed in electro-plating have an E. M. F. of three or four volts. In the laboratory of the Northwestern University in Evanston, Professor Crew tested to ascertain the voltage of a battery composed of a small gold and a small amalgam filling, the fillings being held in the mouth so that the saliva should be the exciting fluid. The battery yielded .9 of a volt, equal to a Daniell cell.

Among the commonest elements found in the mouth is chlorid of sodium (salt); galvanic action readily breaks up this compound, the chlorin liberates oxygen and unites with the hydrogen of the water, forming hydrochloric acid. Other acids may be formed in this way. The electrolytic action and the acids thus formed are sufficient to roughen the surface of the teeth to give lodgment to colonies of microbes.

Chlorin in its nascent state will readily unite with the mercury of the amalgam, and the chlorids of mercury may be formed in sufficient quantities to produce symptoms of mercurial poisoning in those susceptible to its influences. These salts of mercury may also explain the immunity from decay of teeth stopped with ill-fitting amalgam plugs, the germicidal effects of the mercury being sufficient to prevent colonization by micro-organisms, and consequent destruction of the tooth.

The oxygen might, from peculiarities of the individual case, unite with other salts than those of the teeth, and the same with the acids.

The usual result of placing amalgam in the back teeth, while gold is placed in the front teeth of children, will explain why the gold fillings have to be renewed so often; also, that in the electrical action is a clue to the oft-repeated tale of patients that amalgam stands better than gold, as the amalgam still remains and the gold fillings, that have been replaced several times, are loose again.

If amalgam must be used, use those grades that will readily become coated, as the coating will reduce the galvanic action, protecting the plug from the fluids of the mouth, except where attrition and brushing keep them bright. Gold and amalgam, in fact any metal filling, should be avoided for teeth that are of such soft structure that the pressure produced in inserting gold would tend to break down the tubuli.

Fortunately, we have other than metallic filling-materials—cements and gutta-percha. Often in practice where called upon to do what is best for teeth, where it seems almost beyond belief that the pulp's vitality can be retained, yet by thoroughly preparing the margins of the cavity, sterilizing the decay covering the pulp and filling with cement, we find that in from one to three years the disintegrated dentine is easily scraped from that which has hardened by the treatment of sealing up the ends of the tubuli, and we have an ideal condition, dense, hard dentine.

DISCUSSION.

DR. WOOLLEY. It is very different making an experiment out of the mouth and making an experiment in the mouth. I think we should take with a degree of caution the assertions that have been made in regard to this special subject. We ought to be very careful about considering experiments out of the mouth as conclusively proving that certain operations in the mouth are a failure. We must consider operations in the mouth and under good operators and under durations of time, so as to draw proper deductions.

DR. J. Y. CRAWFORD, Nashville, Tenn. If this paper is to in-

vite discussion and investigation on the subject of electricity from a dental standpoint, it is certainly entitled to consideration; if it is to combat the use of amalgam to prevent dental caries, I must give it my additional indorsement. It is my solid conviction that it is the duty of the dental profession to denounce three evils: one is to perform the operation of extracting teeth painlessly, another is the use of methods which develop galvanic action in the treatment of teeth, and the third is the use of amalgam in the treatment of dental caries. I believe the aggregate results following the use of the baser metals have been more hurtful than beneficial to the human family. In the discussion of this question, I have been usually met with the citation of isolated cases to prove that amalgam is good to fill teeth with. All this must be determined by common sense, from a scientific standpoint; scientific truth is common sense made exact. I was told a good many years ago that I could not practice dentistry without the use of amalgam. I say to-day that this statement is false, because I do so practice it more successfully than when I had the nefarious stuff in my office. I want to support the moral force of the paper that has been read, and to encourage my profession along the line of trying to reach higher attainments.

DR. PRUYN. This is a question in which I am considerably interested. It is a question upon which I have experimented constantly, and if the experience of twenty years in the use of amalgam is worth anything, I would like to add my testimony of the proper use of amalgam. The curses that have been heaped upon amalgam had better been heaped upon the careless operators. You have considered it a cheap material, and have allowed your patients to think it is a cheap material, and you carelessly prepare your cavities when you use amalgam fillings. If you prepare your cavity as you would for gold, of course you will have failures; amalgam can never be placed in a cavity that has an attenuated edge. You must have good borders so there will be no chance for the overlapping edges to break down. Do you put in amalgam for a dollar and a half or two dollars a filling? If you are going to save a tooth by it, and save it just as well as by a gold filling, why not charge just as much for it?

A MEMBER. Did you ever discover this galvanic action in those cases, in an alarming degree?

DR. PRUYN. I never have seen alarming results from electricity generated in the mouth, that the essayist has mentioned to-day. The combination of gold and amalgam as a filling-material will preserve the teeth better than gold alone, and better than amalgam alone.

DR. WHITEFIELD. I think I made the statement in my paper, that where gold and amalgam came in contact, the galvanic action was most violent, but that it soon ceased on account of the coating formed, which protects the teeth. Dr. Pruyn states that he can produce teeth that have been saved by the use of amalgam and gold. In shame, I can show the same kind of work. I used to place in amalgam and gold fillings, and I accidentally placed some in as Dr. Pruyn has. I asked him how he had saved teeth with gold where others had not been able to fill them with gold when there were other amalgam fillings in the mouth. In such a case, there will be galvanic action between the fillings, and there must be action on the tooth-structure. The doctor said he did it in this way, that it developed a hardening action. The galvanic action stimulates the activity of the pulp, so that it deposits a calcific material which cements the ends of the tubuli. I do not think there is galvanic action with gold; that cannot be proven, because the tooth-structure is a non-conductor, and it would be slightly positive to gold, for those who are in favor of amalgam. The chemical change in the experiment will show that around the gold the litmus paper was blue and around the amalgam red; that means acid around the amalgam, and alkali around the gold. I think there would be fewer occasions to put in beautiful gold fillings in the front teeth, if less amalgam was put in the back teeth. We place amalgam in the back teeth and gold in the front teeth, and galvanic action loosens the gold filling, which has to be replaced, and every time it is replaced some of the tooth-structure is cut away.

If cement had been used, we would have a dense tooth, and not so much work to do. Dr. Woolley takes a narrow view; he does not take into account all of the conditions. It is absolutely impossible to bring two dissimilar metals together without galvanic action taking place. Galvanic action cannot destroy the usefulness of tin to any extent.

This subject was passed, and Dr. Jarvie, the chairman, requested that Dr. Gordon White, of Nashville, Tenn., explain his operation of sponge-grafting.

DR. GORDON WHITE. At the request of the chairman, I make what is practically my third report on the treatment of chronic abscesses caused by diseased roots. I have had quite a good deal of experience in this character of operation. We are all familiar with the treatment by removing the apex of the root with an ordinary bur. Very frequently the disease extends from one to two-thirds of the root from the apex. A great many of us will ampu-

tate the root, and a great many will leave the cavity in the bone to take care of itself. Several years ago, I began the treatment of filling with sterilized sponge this cavity, after having burred out the diseased bone. I have quite a number of these cases which have proved very successful. Of course, every instrument is sterilized and you simply fill the cavity with a little piece of sponge, and I find I have no further trouble. I suppose most of you are familiar with the sterilizing process.

A MEMBER. What is your process?

DR. WHITE. I depend very greatly upon warm water; I mean water that has been boiled; I use water at about 160 to 180 degrees. Just dip your instrument in, and wash it with water that has been sterilized by boiling. I dip the instrument in chloroform, which aids somewhat in the sterilization. I then dip it in carbolic acid and proceed with the operation. I cut off the end of the root with an enamel-bur that is furnished by Ash & Co. I frequently amputate the entire root of the molars. I have quite a number of lower molars that are doing excellent service, after its distal entire root have been removed at the bifurcation, as a surgeon would take off your finger at the joint. I sterilize the sponge by keeping it in a solution of two grains to the ounce of bichlorid of mercury, at a degree of one hundred and sixty-four, for perhaps half an hour. I got my first ideas of this operation from our grand old friend, Dr. Atkinson. I have since been practicing it pretty generally, and my friends in the South know of quite a number of my successful cases. I just dismissed a case a few days ago before I left home, where I amputated the buccal root of the first superior bicuspid, and filled it with sponge. The patient came in, a few days before I left, and the wound was entirely well.

A MEMBER. Is this your general treatment?

DR. WHITE. For chronic fistulous openings, where the roots have been filled, I treat them that way almost invariably, particularly if the necrosis is extensive. When the wound is well, the tooth is almost as tight as its neighbor.

A MEMBER. How long have you had such cases, where you have taken off two-thirds of the root?

DR. WHITE. Since 1885, and a tooth treated then is doing well to-day. I had a letter from the gentleman a short time ago, stating "Your pet is doing well, and I hope you are enjoying the same blessing."

A MEMBER. What becomes of your sponge?

DR. WHITE. It is absorbed.

A MEMBER. How long do you wait to make the operation, after putting your sponge in the solution?

DR. WHITE. I keep it in a solution of two grains of bichlorid of mercury to the ounce; I keep it in a bottle, and put it right in the bone. The gum will heal entirely over; there may be, however, the slightest mark after the operation. Of course the pulp-canal is always filled before the operation is performed, and the part of the root that is remaining you want in perfect condition.

A MEMBER: What kind of instruments do you use?

DR. WHITE: I take a lancet and make a crucial incision in the gum. I take a lot of these enamel-burs that have been sterilized; I pass the bur down just to the side of the root, and grind it towards the crown, just the least bit, until I am sure that I strike healthy bone, cut it right across, and with a finishing bur, smooth the ends. Then with a large ordinary bur I grind the diseased bone out of this cavity, wash it out thoroughly with warm water, and perhaps use a little bichlorid of mercury with it. The patient has no trouble at all, and in a day is not conscious of having submitted to the operation.

DR. GEORGE CUNNINGHAM, Cambridge, England. In discussing this question, the new point is the use of sterilized sponge, for filling these cavities. I am happy to say, it has been a good many years since I learned the operation of the amputation of roots: I am also glad to say that I do not have necessity to have recourse to it. I am not prepared to announce any objection to the sterilized sponge, because I use the sterilized sponge in another way. The sterilized sponge has been for the purpose of producing artificial dentine. I should say that the sterilized sponge might give very satisfactory results indeed. At the same time, I am not quite clear as to its advantages over the other method. The difficulty I have is to find out where the end of the root is.

Subject passed, and meeting adjourned to 2.30 P.M., Friday.

SECTION VII.—PROSTHESIS AND ORTHODONTIA.

The Section was called to order by the chairman, Dr. Goddard, at 2.30.

Dr. C. S. Case read the following paper:

SOME PRINCIPLES GOVERNING THE DEVELOPMENT OF FACIAL CONTOURS IN THE PRACTICE OF ORTHODONTIA.

The writer stated his belief that we are at the beginning of a renaissance in orthodontia which will not be satisfied with the mere correction of malposed teeth, but will include as indispensable the

correction of all facial deformities which have resulted from irregularities of the teeth and jaws, and the development of every esthetic contour of the face that can be accomplished by a scientific application of force to the underlying bony structure. In the ordinary dental practice of correcting irregularities of the teeth, not enough attention has been given to facial effects; the principal aim having been to bring the teeth to a more perfect position and occlusion. While this has usually resulted in an improvement in the appearance of the face, even when the features were in repose, the development of facial contours from an esthetic standpoint seems rather to have been a result than one of the principal aims of the operator.

In examining dental literature in this department, one is surprised to find so little said in regard to the movement of the roots of teeth, and the methods by which it may be accomplished; and in no place have I been able to find a single proposition for the outward or inward movement of the roots accompanied by a relatively slight change in the occluding position of the crowns; and nothing also in regard to the movements of the roots, for the purpose of giving a more perfect contour to the face by changing the shape of the underlying bone. Dr. Farrar refers only to the movement of the entire tooth in a lateral direction. It is thus evident that the movement of the roots of teeth is a rare and somewhat modern accomplishment, and which doubtless never would have been possible under the old régime of regulating plates and their numerous force contrivances. Dr. Farrar thus perfectly states the only method by which a movement of the roots in the direction of the force is possible: "The secret of effecting a lateral movement of the roots of the teeth lies in relatively fixing the antagonizing ends of the crowns while the force is being applied at their necks."

The purpose of this paper is to show how this principle of force may be applied to the outward and inward, as well as to the lateral movement of the roots of the teeth; and to illustrate also the importance of this possibility, when it is observed in this operation that the bones of youth do not remain stationary to be plowed through by the roots, in a process of retrogressive metamorphosis, but that a considerable portion of the bone in which the teeth are imbedded is carried with the roots in proportion as they are changed in position, thus enabling one to regulate many imperfections of the face by changing the shape and surface contour of the frame which supports and gives character to the features over all that portion which can be affected by a movement of the bones contiguous to the roots of the teeth.

The facility with which the entire intermaxillary process can be carried backward or forward under a proper application of force to the incisor teeth, has been a source of surprise and pleasure to me from the time when I first attempted the operation—less than a year ago.

I am now able to correct, with perfect certainty of success, any marked depression or protrusion of the upper lip which is mainly due to a malposition of the *roots* of the incisor teeth. Instances are frequent of comparatively perfect alignment and occlusion of the teeth, where because of the position of the roots with a consequent abnormal depression or protrusion of the adjoining bone, considerable imperfection of features and external contour of the face is produced. Marked depression of the upper lip is often mistaken for a prognathous lower jaw, because of the lack of proper fullness in the central features of the face, which frequently affects the shape of the nose and deepens the lines on either side. For the same reason the cheek-bones will at times appear abnormally prominent, giving to the face a broad and flattened appearance; especially if the cuspids, being retarded in their eruption for the want of room, take a more lateral and prominent position. If the lower teeth are in proper relative position and the deformity caused, as is most common, by the lower incisors occluding in front of the uppers, every change desirable may be effected by an appliance attached to the superior teeth alone. As an illustration of this, I call your attention to the models in case 2, which, with others, will be fully described later.

On the other hand, if the entire superior dental arch is narrow and contracted, with a high palatal dome, the teeth long, uncrowded, and not materially affected in position by occlusion, the face will usually be long and narrow, the nose prominent, thin, and of the Roman type. In those cases the entire dental arch and alveolus should be expanded, and the force so applied and controlled as to retain the teeth in an upright position, especially in the process of carrying the anterior teeth forward, which is of vital importance in the restoration of the features of the face. The principal force, therefore, should be exerted upon the anterior superior teeth and reciprocated by rubber bands extending from the posterior part of the upper appliance to the anterior part of the lower. These bands can be made to exert almost any desired force and be worn continuously.

A large inferior dental arch with the teeth occluding outside of the superiors, may be reduced in size by the extraction of a bicuspid on either side and the anterior teeth forced back to fill the space.

If the chin is abnormally prominent below the incisive fossa, teeth should not be extracted from the lower, but the principal change to correct the facial deformity should be accomplished on the upper jaw.

I have abandoned all attempts to reduce a prognathous lower jaw by external pressure upon the chin. Rubber bands, extending from the upper to the lower appliance, can be made to exert all the force the patient can stand at the glenoid fossa, and tends to force the lower jaw to a more posterior position.

Protrusion of the upper lip at that point where it merges into the nasal septum and orifices may be reduced, when due to a malposition of the roots of incisor teeth alone, causing abnormal prominence of the anterior nasal spine and incisive fossa. This position is not uncommon, even when the antagonizing ends are in perfect position, and often with the production of quite a marked facial deformity.

In like manner I am able to force the anterior inferior teeth bodily forward, with the entire imbedding alveolar ridge. Instances are not rare where the point of the chin, the upper lip, and the anterior superior teeth are relatively in proper position, but with inferior teeth so posteriorly placed as to produce an abnormally deep depression or curve in the lower lip along the line of the incisive fossa. By forcing the anterior inferior teeth forward with the alveolus a more esthetic shape will be given to the chin; a change will often produce a remarkable improvement in the general appearance of the face. The same is true, also, in forcing back the inferior incisor teeth and alveolus, when they are so anteriorly placed in relation to the point of the chin as to obliterate the graceful curve of the lower lip.

Forcing the inferior teeth and this part of the face forward is often of material aid also in the reduction of that unhappy deformity caused by a prognathous upper jaw with protruding teeth.

I believe that a large proportion of facial imperfections are due to inartistic relation of those features of the face whose form and contour are governed by the position of the teeth and the peripheral surface of the bone in which the roots are imbedded. If, by force appliances attached to the crowns of the teeth of young persons, the roots and the alveolus can be forced outward or inward to any desired extent, a new field will be opened to the practitioner in orthodontia, a principal feature of which will be the correction of many deformities of the face, heretofore considered beyond the reach of orthopedic surgery. In a large proportion of those deformities which seem due to protrusion or recession of the chin, the chin is not far from its

proper relative position to the forehead, the upper portion of the nose, and malar prominences, the deformity being due mainly to the relatively imperfect position of the anterior superior teeth and the adjoining bone in which they are imbedded.

If the crowns of these teeth are forced backward or forward to a more perfect alignment with the lowers, the facial defect is only partially remedied and the real deformity far from being removed, if not increased, as it may be, by the tendency of the roots to tip in an opposite direction. But if, on the other hand, the teeth are firmly grasped by appliances so constructed that the force can be applied directly to the roots while the antagonizing ends of the crowns are fixed or controlled in their movement, it will be found that the roots as well as the immediately surrounding bone will be moved and made to take a position which will give a far more pleasing appearance to the face.

The peculiar apparatus which I use for applying force to the roots of the anterior teeth in facial contouring was first put into practical use by me December 24, 1892, and described in connection with a paper I read before the Chicago Dental Society the following February, which was published in the March number of the *Dental Review*.

In constructing an apparatus for forcing the roots and adjoining bone of the anterior teeth forward, wide German silver banding material for the teeth should be selected, that is, 5 or 6 thousandths of an inch in thickness. This should be fitted to the crowns of the anterior teeth near the margins of the gum, perhaps extending beneath margins on the proximal sides. Then bars of No. 18 E. S. G. wire, slightly flattened, should be soldered to each of the bands in an upright position, and bent so as to lie along the anterior surfaces of the crowns from the apex to where the bars join the band; here they should take a direction somewhat parallel to the gum, but free from the surface to about one-eighth of an inch above its margin, at which point they should be flattened or thinned so as to be more easily bent forward and firmly clasped around a rigid bar, which is made to extend from anchorage tubes attached to the posterior teeth.

This bar, which should be very rigid, is drawn without annealing from a No. 12 extra hard German silver wire to No. 18 E. S. G. The ends are threaded in the No. 4 hole of the Martin screw-plate, and the central portion slightly flattened in the rollers. Then it should be bent so as to rest, when in proper position, in the unclasped ends of the upright bars that have been left open to receive it. Before

placing it in position the nuts should be screwed on to work at the anterior ends of the tubes.

This apparatus can be made to exert an exceedingly powerful force, but if put into practical use as it now stands the ends of the roots and adjoining bony structure would not be forced forward, notwithstanding the fact that the power is applied directly to the roots somewhat above the cervices. The crowns and the body of the roots, with a portion of the alveolus only, would be moved forward.

To complete the apparatus the fulcrum should be removed from the anterior alveolar plate, and placed so that the power can be applied between it and the ends of the roots to be moved. In other words, the crowns should be restricted or controlled in movement so that the applied force may be directed to the roots alone.

I accomplish this by a second bar, much smaller and thinner than the first but proportionately rigid, which rests in depressions in the upright pieces along the occluding ends of the teeth. The ends of the fulcrum bar are threaded and passed through tubes that are soldered to the anchorage bands on each side below the power bar tubes, with nuts which work posteriorly to the tubes.

An apparatus for reducing a prominence of the features by exerting a posterior force upon the roots and alveolus of the anterior teeth is constructed in a similar manner to that just described, with the following exception: (1) The bands should be fitted to the crowns of the incisors near their occluding ends, for the purpose of obtaining a more rigid bearing in the changed application of force. (2) The lower ends also of the upright pieces should be made to clasp the fulcrum bar. (3) The nuts should be reversed in their relative position to the tubes. (4) In moving the roots of the cuspids where required, short sections of pipe are clasped around and soft-soldered to the bars to prevent them from slipping through the clasps at the ends of the upright pieces.

In the contouring apparatus I have outlined, the force expended at the anchorage attachments is largely neutralized by the reciprocating influence of the two forces, and this reciprocation is always equal to the power used on the fulcrum bar in preventing a movement of the occluding ends of the corners. The balance of the power, which may be considerable in the general movement of the parts, must be sustained by the anchorage teeth if not further neutralized by other auxiliaries.

When the central features of the face are depressed with anterior superior teeth occluding posteriorly to the lowers, accompanied by

the usual real or apparent prognathous lower jaw, great reciprocating force may be beneficially obtained from the rubber bands before mentioned. These are cut from a three-eighths inch rubber regulating tube of good heft, and passed over the projecting ends of the anchorage tubes on the upper appliance to buttons on a lower appliance opposite the first bicuspid. The latter appliance may be so constructed that the force will be distributed to all the inferior teeth and indirectly to the jaw, forcing it to a more posterior position. The elastic force of the rubber bands can be made to do effective work to the full extent of their power, that would otherwise be expended upon a static anchorage neutralizing force on both the upper and lower jaws. They are useful also as an auxiliary in the reduction of a prognathous upper jaw by reversing their attachments. In these cases I also make use of the occipital force, largely for the advantage I obtain in forcing the anterior teeth farther into their sockets. Cases of prognathous upper jaw with protruding teeth are rare in which there is not abnormal prominence at the base of the nose—of the bones that sustain the septum and wings of the nose. When the crowns alone of the anterior teeth are forced back, this prominence becomes more pronounced, even though the position and appearance of the teeth and the face are improved.

In these cases, therefore, I consider it quite as important to move the roots as well as the crowns of the anterior teeth, when by so doing I find I am able to remove the entire deformity and greatly improve the general form of the face.

[Dr. Case then presented a number of models of cases showing the action of the contouring apparatus when put into practical use.]

DISCUSSION.

DR. G. V. BLACK, Jacksonville, Ill., said he would speak about a certain class of irregularities where there was protrusion of the lower jaw with open bite. In such a case, as the patient grew older, the chin would drop, the jaw lengthen by an increase of the distance between the ear and the point of the chin, there would be increased fullness of the face under the eyes and apparent broadening of the face, and heightening of the cheek-bone. These are the characteristics of these cases. Sometimes these changes are very slight; sometimes pronounced. Their progress is always slow.

All of you who are acquainted personally with orthopedic operations know how easy it is to effect the bending of the long bones of the human frame. The bones of all parts of the human body in children are so soft that they may be easily bent to almost any extent by persistent effort, the bones of the jaw as readily as others, and if

we will find any factor which is constantly acting toward change in the shape of this bone, we may be able to explain this gradual change in the shape of that bony framework which supports and gives character to the human face. The first factor in these cases is always, I think, some little irregularity in the teeth. It usually begins about the seventh or eighth year, and grows worse till the nineteenth year. About this time there is a slight amelioration, so slight, however, as not to amount to anything. The cause is usually malocclusion of the first molars, which causes the bite to jump a cusp. Now, how can this cause all these special characteristics? The muscles closing the mouth, by constant tension, have the effect of scraping the bones of the jaw. This at an early age will not be noticed, but as years go on the deformity will become worse until about the age spoken of.

Dr. Black was asked if the jumping of the bite was caused by the too early extracting of the first molar. He said it might be caused by anything that would bring about the malocclusion of the molars.

Dr. MITCHELL, London, asked at what age the best results could be hoped for from operation, whether it was not best to operate before fifteen years of age?

Dr. CASE replied the earlier the better, after attachment could be made to a permanent tooth.

Dr. H. H. ALLWINE asked if appliances could be applied to any of the permanent teeth before all of the permanent teeth were erupted?

Dr. CASE said yes, that a large majority of the operations were performed before the third molar was erupted.

Dr. AINSWORTH asked how late it would be advisable to undertake such an operation.

Dr. CASE said one case, partially completed, a lady twenty-two years of age, who has been under his care three months. There is quite a marked improvement, and he expects to do much more for her yet.

Dr. E. A. BOGUE, New York, would say in answer to the last question, that he had two patients who were treated at twenty-eight years of age, and both were successful, and though the treatment was twenty years ago, there had been no return of the deformity. He wished to thank Dr. Case for devising the appliance shown this afternoon. He had never before seen anything as good. Cases of prognathous upper jaws are the hardest to treat, because, as in the case of Archimedes, we have had no place to put our fulcrum. Perhaps now we will have found the place.

DR. J. G. REID, Chicago, had had the opportunity of seeing several of these patients of Dr. Case's, and the only criticism he had to offer was that the models do not adequately show the improvements made.

DR. A. E. MATTESON, Chicago, had no record that he could prove, as these casts prove, that he had moved the roots as he wished to move them. The appliance of Dr. Case is very ingenious, and he would thank Dr. Case for it, as he meant to try such a one. The use of soft rubber bands causes considerable pain, so that the patient cannot endure to wear them continuously for a long time.

DR. GODDARD said it has been acknowledged by almost every one that they have not succeeded in moving the roots of the teeth. I think the appliance shown to-day will show it if anything will.

DR. GARRETT NEWKIRK, Chicago, felt proud that we have at this time such an exhibition as this. It has been only a few years since orthodontia has taken the place it deserves in the profession, but this work is the work of the specialist, as few will have the ability and the painstaking patience required. In regard to the age at which such an operation can be hopefully undertaken, he had regulated teeth for a man over forty years of age; he kept the retaining appliance in for more than a year. One thing in regard to Dr. Jackson's paper of yesterday: When I heard it read, I did not think that such operations could be successful, but to-day I spent three or four hours with him, listening to his explanations and studying his models, and I am convinced of the very great value of his appliances.

DR. W. H. MARSHALL, Oxford, Miss., asked whether in cases where protruding teeth are moved, the teeth moved back or forward in the alveolus, or whether the whole process was compressed and thrown back in a body. He spoke of a case of his of protruding lower teeth which he had regulated by extracting the first molar, and putting pressure on the chin. He succeeded in moving them into place in six weeks, and is convinced that the bone was bent back.

DR. CASE replied that an examination of the models would show that the bone had been bent, especially where the force was applied to the anterior teeth.

On motion, the subject was passed, and the Section took up the discussion of the topic of the day: "What are the Etiological Factors in the Production of (a) the Protruded Lower Jaw; (b) the Retracted Lower Jaw? When this form of Irregularity is corrected by 'Jumping the Bite,' does a Compensating Adjustment take place in the Temporo-Maxillary Articulation?"

DR. E. S. TALBOT, Chicago. In regard to the protrusion of the lower jaw, there are two factors outside of dentistry which enter into the causes: Heredity and excessive or tardy development on account of a neurotic state. Just what produces this neurotic state we do not know. It may be mixture of race, intermarriage among relatives, use of alcoholic liquors, or disease. If we examine the skulls of people of several centuries ago, or those of some few races existing to-day, we will find the jaws generally normal. But the advance of civilization has produced two types among our people, one of overstimulation, or over-developed brain, and a degenerated or under-developed brain. In either case we are liable to have an unstable development of the osseous system and other organs of the body. I have noticed such deformities, in from forty-five to sixty-five per cent. of people of average development. The jaws develop in accordance with development of the brain. We get from this at times protrusion, and at other times arrest of development of the lower jaw.

DR. NEWKIRK thought the cause was more frequently the irregularity of the teeth, and he asked Dr. Case to give his idea of it.

DR. CASE had not been especially interested in the cause of the trouble. He knew when a case came before him that he could cure it, no matter what was the cause.

DR. NEWKIRK said he had in mind those cases that we are called on to remedy that are unnatural. Now, as to why one person has a prominent lower jaw and another a prominent upper jaw, I do not think anyone can tell, nor do I think we can tell why we differ in other ways. The question is not practicable.

DR. H. H. SCHUMANN, Chicago. Dr. Case has said we have nothing to do with the causes of these abnormalities. I think it is better to look for the causes, in order, if possible, to be able to avoid the trouble. It would be well to inquire into the family history to see if there were other such cases in the family.

DR. TALBOT said that after Dr. Case had read such a fine paper on irregularities of the teeth, he was sorry to have him go on record as not caring to know anything of the cause. For several years he has been studying the causes of irregularities, and was able to correct them with very simple appliances in some cases, because of the knowledge gained. He asked the opinion of those present as to the possibility of "jumping the bite" the distance of one or two cusps, by moving the jaw forward so as to make a new joint.

DR. GODDARD did not think there was a possibility of jumping the bite permanently. He had one patient whose anterior teeth closed in such a way that their edges came exactly together, and the

mouth was shut naturally. In order to masticate he had to protrude the lower jaw so that the incisor shut outside the upper ones. The bite had not jumped in this case, though the patient was over thirty years of age.

DR. MORRISON, of St. Louis, regretted that he had not heard the paper, but the president's remark called to mind a similar case of his own. He corrected the irregularity by throwing the upper teeth forward far enough to put the teeth where they could close, but found that the centrals and laterals could not be held in position, being too short to meet. He built up the crowns of the superior centrals with gold shells to hold the teeth till the molars were settled in their sockets, and ground down the cusps until now the occlusion is nearly perfect, and he thinks the proper space will be gained so that he can remove the shells.

SECTION VIII.—EDUCATION, LEGISLATION, AND LITERATURE.

The Section was called to order by Dr. J. J. R. Patrick, chairman, at 2.30 P.M.

Dr. Wm. O. Kulp, Davenport, Iowa, read a paper entitled, "Dental Nomenclature," which presented an amplification of the system of terminology he had advocated before the American Dental Association in 1885.

Dr. J. L. Secher, delegate from Copenhagen, Denmark, explained a system of notation for the teeth and cavities which is very simple, but deficient in that it makes no provision for locating fissures or the portion of a surface on which a cavity may be located. The teeth are numbered from 1 to 8, beginning at the median line, the upper teeth being designated by the sign plus (+) the lower by the minus sign (-); the teeth on the right are indicated by -1, -2, etc., those on the left, 1-, 2-, etc. The

4

surfaces are noted 3 1 5 -. A cavity on the grinding-surface

2

of a right upper second molar would be indicated by + 7¹; on the distal approximal surface of a lower left second bicuspid would be -5.⁴ Dr. Secher's command of the English language being very limited, his remarks were confined to illustrations of these figures, which as stated by Dr. Kulp was a revival of the system of the elder Zsigmondy, given to the profession in 1861.

DISCUSSION.

DR. A. C. HEWITT said that as we are particularly an English-speaking people, he wished to ask if in case the Congress adopts a

system of nomenclature it would be construed as international in its scope, or would it simply be one to be adopted by the English-speaking people of America?

DR. J. J. R. PATRICK said there never would be formulated a universal system. These papers were only the expression of individual opinion. No discretion was given the Sections. The papers were accepted, read, discussed, and handed to the Publication Committee.

DR. HEWITT expressed his hearty approval of the system proposed by Dr. Kulp, which appears to be simple, accurate and complete, and complimented the acute, nice distinction in the use of words. We want English words with which to propound English questions, to be answered by English-speaking pupils. He particularly commended the distinction drawn between the grinding-surface and the occluding surface of the different teeth. He thought that with but very little study he would be able to so locate any possible cavity in any tooth that Dr. Kulp would at once recognize the position he had in mind. He said that he was not a teacher himself, but he frequently had occasion in writing to desire a more simple form of locating a cavity than to say, for instance, that it was about half-way down the outside surface of a left lower molar; that required too many words.

There being no further remarks, Dr. Kulp, in closing the discussion, said that he had endeavored to be very specific in his use of terms. So far there has not appeared in any text-book any absolute unbroken system. He found he required a system that he could use from the first day of a session to the last, which once taught in the first lecture would be retained unchanged. In this system he has coined no new words—has only used derivations from words in general use which explain themselves to anyone at all familiar with the teeth. The committee will not find it possible to recommend any arbitrary system; many will be presented, discussed, placed before the profession in the journals, and perhaps at the next international congress a system may be adopted, acceptable to all. His own system he has found satisfactory to himself and acceptable to his scholars.

No discussion was offered on the paper of Dr. Whitney, on Hawaiian skulls, referred to this Section.

Dr. H. B. Noble, Washington, D. C., read the following paper:

DENTAL LEGISLATION.

There seems to be a surprising lack of correct information as to examinations by those who talk and write upon dental legislation.

and many of our dental laws have been based upon false representations of what was required of other professions. The advocacy of universal examinations by dental examining boards has been based upon the statement that other professions had to undergo an examination whenever they moved from one State to another, and nearly all our dental journals have had articles from professional writers like Dr. Sudduth, stating that lawyers were subject to examination when going from one State to another, and that they could not practice before the Supreme Court of the United States without examination, although a member of the bar in good standing in the State where he resided.

No lawyer is or ever was examined for admission to the bar of the Supreme Court of the United States, and the same is true of the courts of the various States. In Pennsylvania, New York, Ohio, and some other States, there is a rule of the bar that no man be admitted as a member from another State unless he has been in practice for a certain time, one or two years; yet as a matter of fact if a lawyer, for example from Washington, although not a member of the Washington bar for a sufficient time to bring him within the rule, has a case before a New York court, he gets a friendly member of the New York bar to move the honorable court to allow his friend to try the particular case he has on hand, and the motion is always granted; so that the rule is avoided by a friend in court, and yet this and other like statements have been made the basis of dental laws requiring every man, young or old, to go before an examining board if he remove from one State to another and wish to continue to practice his profession.

Many of the dental laws have not been as carefully drawn by a good lawyer as they should have been.

There is a feeling that no professor in a college should be on an examining board. These are the very men best qualified to properly be on the board, and if we could have at least one teacher on every board it would be a good thing, and tend to bring into harmonious relation our colleges and examining boards, for they ought to work and fit together in their work, which has the same end and aim in view, the education of dentists.

Let us guard well the entrance to the dental field, and see that no unworthy man is allowed to pass in, but let us not undertake to divide the field into sections, allowing a man to practice only in his section, and refusing to allow him to pass from one field to another without facing an examining board whose qualifications are unlikely to be superior, if indeed they equal those of our college teachers and professors. Our colleges are our sources of strength, upon

which we must rely for educating and elevating our profession, and all our laws should be directed to the encouragement of college education and systematic training.

Miss Martine Magnus not being present to read her paper on dentistry in Norway, announced for to-day, the Section adjourned to 2.30 Friday.

CLINICS AND DEMONSTRATIONS.

Dr. J. W. Penberthy exhibited a new bracket-table. The peculiarity of this table consists in the arrangement of the bottom of the drawers. These are hung on pivots, so that when the drawer is pulled out the back end of the bottom swings down. Holes extend through the bottom to contain the instruments, and when the drawer is extended the points of the instruments are in sight and convenient to the hand.

Dr. T. W. Brophy operated for a lady about forty-five years of age, suffering from disease of the right antrum of Highmore. The palatine process was pressed downward and showed an inflamed condition, with an indication to point and form a fistula. The lateral wall was considerably distended, the inner or nasal wall necrosed, and a discharge from the antrum was passing out through the nostril. The patient was etherized, and an incision made from just below the articulation of the malar bone with the maxilla and forward to a point over the position of the first bicuspid; then a second incision, a little below and parallel to the first: and with a surgical bur driven by the new surgical engine introduced to the profession at this meeting by Dr. Cryer, an opening was made through the bony wall. The diseased tissue with which the cavity was filled was removed, when it was found that the necrosed condition extended through the entire wall between the antrum and nasal cavity, all of which was removed, leaving the two cavities as one.

Dr. Geo. Cunningham showed his process of continuous-gum work with low-fusing enamel and body. Also the staining or tinting of artificial teeth to resemble accidental defects in natural teeth.

Dr. Barrie exhibited a hot-air injector with four adjustable points for puncturing abscesses, injecting abscesses, enlarging fistulæ, and for ablation of epulitic growths. The instrument is attached to a reservoir containing gasoline, to which there is a bulb

attached for forcing air through the reservoir. In use the point is heated over the flame of an alcohol lamp or Bunsen burner, the heat being kept up by the combustion of gasoline vapor. It is very convenient for drying out teeth or any other purpose to which a cautery may be put.

He also showed a universal forceps devised by Dr. Poinset, of Paris, with changeable beaks. This instrument departs widely from the usual form, as the beaks are not closed by the leverages on the handle, but by a mechanism similar to a monkey-wrench.

Dr. Godon, of Paris, showed a collection, from Dr. Martin, of Lyons, of soft-rubber vela to be attached to hard-rubber plates for closing fissures in the soft palate. In constructing this apparatus, instead of using vulcanizable rubber in the way we do, he dissolves it in chloroform and paints it over his matrix or mold. In this way he avoids air-spaces and consequent porosity after vulcanization.

In one case the velum is hollow and subsequently partially filled with water, to make it more adaptable to the soft parts. This is done by vulcanizing it over a plaster core; then the piece is punctured at some point and the plaster removed through the opening, and partially filled with water and closed by means of a disk or washer and screw, by which also the attachment is made to the plate.

Another appliance he showed was a hard-rubber piece to substitute for a portion of a jaw and teeth which had been resected on account of disease. This piece was made before the surgical operation, measurements having been made for size and shape. Immediately after the operation the piece was placed in position and screwed to the remaining portion of the jaw. It was simply a temporary appliance to prevent the falling in of the parts where the muscles are inserted, and after being worn a few months, its object being accomplished, it was removed and replaced with a hard-rubber plate and teeth of similar form. This method is named the "Prothèse Immediate," of Dr. Martin. Dr. Godon presented also several other appliances for removable bridge-work, etc.

Dr. J. H. Morrison, of Connersville, Ind., showed a system of punching up crowns from solid plate. He takes a disk of metal and forces it through different-sized holes till he gets a parallel-sided tube closed on the end. He then about half fills this tube with small shot, places it upon the die-plate representing the coronal surface he desires, and with repeated blows of the hammer the cap is made to take the form of the masticating surface of the tooth. The spreading of the lead gives a bulging shape to the part below the crown.

Dr. I. Simpson, of South Carolina, filled a central incisor with

gold. The cavity extended up under the cervical margin, and the operation was performed without the use of a rubber-dam.

Dr. Louis Jack, Philadelphia, demonstrated the use of the Jack matrices and matrix-pluggers.

Dr. W. G. A. Bonwill filled a right superior central, with pulp intact, and the whole mesial surface involved. A large portion of the cutting-edge was gone, and the crown had many cracks. No retaining-pits were made, — groove only at cervix, from labial to palatal face. The walls were very thin and fragile. He used Abbey's No. 20 gold, adhesive, not folded; also Abbey's No. 5, non-adhesive, rolled in the fingers and annealed, but not made adhesive.

Twenty-seven minutes was consumed in packing in a book of foil. The object was to show that gold—adhesive or non-adhesive—can be perfectly packed by smooth, oval-faced pluggers, of special design. No rough or serrated surfaces are ever used.

He also gave a clinic and a demonstration in his own mouth of his method of clasping teeth on all-gold plates, from one to full upper set, where one tooth only remains.

He explained his principle of practice in the use of pink gutta-percha base-plate for filling all cavities, and obtaining greater width of separation between the bicuspid and all the molars. He showed its use as a matrix in filling with gold or amalgam, also the use of paraffin in being melted over and into all oxyphosphate fillings to make them harder and last longer; also melted it over all-gold fillings to hermetically seal any vacancy that might be between bone and filling. He converts his hand-piece into a mallet instantaneously.

FIFTH DAY—GENERAL SESSION.

Meeting called to order by Dr. Shepard.

A paper by Dr. John Girdwood, L.D.S. Edin., D.D.S. Univ. of Penn., Edinburgh, Scotland, entitled, "English Tube Teeth; Their Uses in Plate, Crown, and Bridge Work," beautifully illustrated by many diagrams, was read by Dr. A. O. Hunt.

ENGLISH TUBE TEETH; THEIR USE IN PLATE, CROWN, AND BRIDGE WORK.

The absence of a detailed description of the method of using tube teeth from any of the standard American works on operative or mechanical dentistry, has long been a subject of surprise to me.

The English tube tooth differs from the flat favorite in one essential, viz., that its attachment to the piece to which it is adjusted is effected by means of a central tube (running through the body of

the tooth), and into it a pin or post is introduced. A few of the advantages claimed for tube teeth are:

First. Although adaptable in any situation on both jaws, they are specially superior as masticators. They are much stronger than their flat rivals. The tube tooth is supported over its whole lower surface, and the greatest strain in occlusion falls mostly in a vertical direction, upon the crown, whereas in a flat tooth the impact of the bite is more evenly distributed.

Second. They allow of easy removal for repair.

Third. Their use entirely removes the danger of warpage in soldering the backings of flat teeth to the plate.

Fourth. They are more adaptable; a very long tooth can be cut down to any length, and, the body being of the same texture throughout, can be ground and polished perfectly.

Fifth. They can be used for plate, crown, and bridge-work, and in some cases in combination with vulcanite. From their ease of adaptability, a small stock of these teeth goes a long way.

Sixth. Being a more faithful reproduction of the teeth they replace, they feel more comfortable to the tongue, and are less bulky.

Seventh. They are more easily kept clean, because backings are done away, and with better supports substituted, which being surrounded by porcelain are out of the reach of any impurity.

For crown and bridge-work they have all the advantages already enumerated, and, in addition, they can be more perfectly and directly fitted to the root than any other form of porcelain crown. They retain when mounted for wear in the mouth, their translucency and natural appearance, so often destroyed by the gold backing.

There seems to me, however, to be one defect in the tube-incisors and cuspids as at present manufactured. In these the base is frequently too small antero-posteriorly, and consequently in many cases it is impossible with them to cover the root completely. Moreover, the tube is very often too near the front, thus destroying the axis of the crown with its root. The bicuspid and molars, however, are free from any such fault, and are pre-eminently adapted for crown-work.

The application of tube teeth requires the use of a special set of simple hand tools which had best be described here.

A counter-sinker for clearing away the burr which forms upon the end of the tube when ground, and for slightly enlarging the orifice of the tube at its base.

A tube file to remove the *débris* from the tube after grinding.

A marker. A piece of straight round wire fitting the tubes easily, but not loosely, and with one end filed almost to a central point.

A pair of flat-pointed pliers with a longitudinal groove in them for holding the pin while it is inserted in its socket in the plate.

A sharp-pointed graver.

A length of gold pin-wire.

A pot of paint, made by mixing olive oil and vermilion.

The respective uses of these tools will be best described in an explanation of the method of mounting the teeth for which they are required.

For this purpose we shall take, by way of illustration, a partial gold upper, where the lateral incisor and cuspid on the right side and all the grinding-teeth on both sides, except the second right upper molar, are absent. Having struck and fitted the plate in the ordinary way, and fitted the clasp, a tube tooth is now selected for each side. Care must be taken that the teeth chosen shall be longer than is apparently necessary, so that some tooth-substance may be to spare in fitting to the plate and bite. They are now roughly fitted in the positions they will occupy. The counter-sinker removes the burr from the platinum tube at its ground end, and the tube file clears out all *débris* from end to end. Having seen that the tube is clean, replace the teeth on the plate and fasten them in their desired positions with hard wax. Now pass the marking wire *tipped with vermilion paint* down each tube till it touches the plate, where it will leave a mark showing the places at which the holes are to be drilled to receive the pins. Remove the teeth from the plate, taking care not to injure the color-mark. This undisturbed, take the sharp-pointed graver and make a slight pit for the drill; do not here take the plate from the model, but proceed to drill the holes for the pins, being heedful to keep the drill in every respect at the same angle as was made by the marker with the plate. By means of a broach the holes should be enlarged till they are just a little too small to receive the pin-wire full thickness; the rough edge or burr left by the drill must be removed by file and graver, and the hole slightly counter-sunk on both sides. A suitable length of gold pin-wire should now be cut, and the end which is to fit the socket in the plate should be slightly tapered, so as to fit tightly and project a little way through on the palatal surface. A slight groove may with advantage be made longitudinally on the tapered end of the wire, for it assists the solder to run more readily from the palatal to the lingual surface. The tapered end of the pin and the pin-hole are then touched with borax, and the wire fixed firmly in place by means of the pliers, attention being paid to its direction. The tooth is next tried on, and having ascertained that this particular point is correct, we proceed to solder the pins, drawing the solder through from side to

side. It is not necessary to invest the plate for this purpose, for the tightness of the pin in its socket will support it sufficiently. In soldering, it is of the utmost importance that the smallest possible quantity of solder be used. When the plate has cooled, the flux is removed by boiling in pickle. From the palatal surface cut off the projecting end of the pin, and smooth it down with corundum wheel and graver till it is level with the plate. Now replace the plate on the model, and file down the pins till they accurately fit the bite. Place the teeth on the pins, and if the latter should have tilted in soldering, it will be at once seen, and may be corrected by grasping the pin close to the plate and bending as required.

Now comes the fine fitting of the teeth, done best with small wheels. Paint the plate where the tooth will touch it, and press the latter gently to place; it does not fit; remove it, and a small red mark will show where it is too long; grind off here, and having used counter-sinker and tube file, try the tooth on its pin again, and continue the process of alternate trying on and grinding till a perfect fit is obtained. Now grind the coronal surfaces of the teeth to suit the occlusion of the bite, using the vermilion paint freely. Next set the cuspid and first bicuspid on the right side, and these finished, the first bicuspid on each side serving as a guide, the pins for the remaining teeth may be inserted at one soldering.

The teeth are then polished and the coronal ends of the pins are finished to show a rounded end, or ground to the bite according to the requirements of the case. This done, the plate is finished in the usual manner. Previous to fixing the teeth, a few shallow cuts are made in each pin with a fine file. When the teeth have been properly cleaned and freed from all traces of oil (which can be best done by boiling them for a few minutes in a strong solution of soda) their tubes are dried by cotton wound round a broach, and their interiors roughened by a clean tube file. The teeth are fixed with sulfur. This material is melted in a small porcelain Berlin cup till it is quite liquid, and is kept in this condition and held by an assistant. The operator himself grasps the plate firmly with the pliers in the left hand, and heats the whole carefully over the lamp. This must be done gradually, and the flame ought not to play on the porcelain. In the right hand he takes a wire spatula, and dipping it in the molten sulfur, conveys it to the heated plate and teeth repeatedly, till a surplus begins to show itself. The sulfur runs by capillary attraction under the teeth and along their pins, and when the whole has cooled it sets hard and the teeth are immovable. The excess of sulfur may be removed with a fine-pointed knife, and the polishing of the plate makes it ready for the mouth.

This description of the method of fitting tube teeth applies in every particular to every case, be it partial or full, upper or lower.

Besides the ordinary tube teeth, single gum teeth of this kind are to be had, and, when judiciously used, they prove as satisfactory as flat-backs.

English Tube Crowns.—In America during recent years attention has occasionally been called to English tube teeth in crown-work, although no details of their application have been given. This branch of practice, however, is common enough in England, although the usual method of fitting the tooth to a model, fixing pin and tooth together, and finally cementing them upon the root, is open to many objections.

An improvement made by my partner, Mr. John Stewart, L.D.S., of Edinburgh, is well worth a description. The method is as follows: The root is prepared in the usual manner. If part of it remain above the level of the gum, apply the rubber-dam to one tooth on each side before excising, having first anesthetized the gum by painting on a twenty per cent. solution of cocain. If possible use a ligature in preference to a clamp for fixing the rubber, because the latter interferes with the bite when the pin comes to be adjusted. Push the rubber up as far as you can, for the reason that it is well to have the union of root and crown covered by the gum when the dam is taken off. Now drill the canal with a twist drill a shade larger than the diameter of the wire to be used as a post. If, as often happens in the first bicuspid, the canal be bifid, a piece of wire may be bent to fit into each canal, and to it the straight post should be soldered, or the straight pin may be "kneaded" and an additional "leg" soldered to it. The post may be made of gold, platinum, or English dental alloy—the last I prefer. The post, where possible, should have a fine shallow thread cut on it, except where it emerges from the root to enter the crown. This part should not be impaired in strength even by a screw thread.

Having selected a suitable tooth, fit it roughly to the root. Place the pin in the root and try on the crown; if it be much out of line with the other teeth, this fault must be put right, by bending the pin or by reaming the canal in the direction necessary, or by a combination of both operations. Now try on the tooth and the pin once more; if everything is right, groove the walls of the canal with a wheel bur, mix the cement, and, placing a little in the canal and round the pin, force the latter to place with the pliers. While the cement is yet soft, take the crown and slightly oil its base; slip it on to the pin, and before the cement sets insure its right position. It had best be held in place till the cement has set. Now

having taken off the crown, trim away the surplus cement from the face of the root. The face of the root may be cut out round the post, and filled with gold or amalgam, if thought desirable. Make the patient close his teeth, and grind the post till it is clear. Now fit the tooth on the root as you would to a plate, but instead of using vermilion paint for fine fitting, use a small disk of thinnest articulating paper and grind off where the tooth is marked by it till a perfect fit is obtained. Next grind to fit the bite margin, remove the excess of porcelain till the sides of root and crown are continuous, and polish. Previous to setting, hollow out the base of the crown, avoiding the edges; this provides for the presence of a body of cement between the root and the crown, as in the Logan and other crowns. Clean out the tube thoroughly and roughen its interior as in plate-work, and fix it with cement, pressing it firmly to place with a Bonwill crown-setter. The head of the pin may be riveted with an engine burnisher, but do not omit to examine the bite before the patient leaves.

The shaping of the root is a matter of choice. The two which I have found best are the "Saddle" and the well-known "New Richmond" shapes. The crown to suit the latter is best fine-fitted by hand, with a three-sided corundum file.

Tube Crowns on Metallic Caps.—If for any reason it is considered advantageous to protect the surface of the root by means of a metallic cap and band, the rubber-dam must be dispensed with. Trim the root, making the sides parallel, and after fitting a collar to it, leaving the gold a trifle high, prepare the canal and insert a post loosely. Next take a plaster impression and bite of the whole; the pin and band will either come away with it, or, should they not do so, they can be easily replaced. Cast and open; fit a coin gold cap No. 30 thickness, and having soldered it to the band, through it drill or punch a hole for the pin; next place it on the model, insert the pin, and when needed, correct its direction by bending before soldering to the cap (the pin will be easily bent if nicked with a file, and as this weakness is repaired by the soldering, it in no way imperils the soundness of the post).

Having boiled in pickle, replace the united pin, cap, and band on the model, and proceed to fit the crown. This done, cement it to cap and pin before inserting them in the mouth. This makes a strong and beautiful crown, and while it is applicable *a priori* to single-rooted teeth, it may be employed on some molars.

Tube Crowns on Living Teeth.—It is seldom that tube-teeth can be used for this purpose, but two cases have lately been treated by me with great success. The first of these was a lower left first bicu-

pid, which had a large amalgam filling, extending to the crown, on each of its approximal surfaces. The tooth was much discolored, and by its presence the looks of a good set of teeth was spoiled. The patient objected to having the nerve drilled into and killed, the more when, on removing the discolored crown, calcification of the pulp was discovered. It was decided to grind down the buccal aspect of the root nearly to the gum-margin, leaving the lingual side considerably higher. A cap and band were made to fit the root tightly and pass a short distance under the gum; a pin was soldered to this, a tube tooth adjusted to it and the bite, and the whole cemented on the living root. This device has been worn for two years, and bids fair to last twenty. The buccal side of the twenty-two carat gold band is almost covered by the gum, and what of it is seen looks like a tiny cervical filling. The second case thus treated does not differ essentially from this one.

English Tube Teeth in Bridge-work.—All the points of special worth given at the beginning of this paper are emphasized when tube teeth are used in bridge-work. One of the great obstacles to making a denture of this kind a success, is the difficulty met with in hiding the gold when the patient laughs. By the use of English tube teeth this is easily accomplished.

For fixed bridges replacing the front teeth they are less suitable, because of the difficulty found in securing proper self-cleansing space.

A case where the cuspids are past filling, and the molars still stand, will serve to explain the manner of constructing a large removable plate bridge with tube teeth. The crowns of the cuspids are to be cut level with the gum and the roots prepared after the usual fashion, the canals being drilled to receive a gold or platinum tube, which should be as long as possible, and sufficiently wide to accommodate a No. 13 post of hard gold. The molars are next trimmed to receive gold crowns, and a considerable notch is cut in the crown and anterior approximal surface of each. This notch (the object of which will be presently explained) should not extend on the coronal surface more than half-way back, nor on the anterior aspect more than half-way from the crown to the gum. Tubes are then placed in the roots of the cuspids and allowed to project about three-eighths of an inch. An impression of the mouth is next taken in plaster, in which the tubes will come away, and it is cast and opened as usual. The plaster teeth and roots are how trimmed, so that the cuspid caps and molar crowns when made will pass a little way beneath the gum-margin. The pattern of cap and band for the cuspid is the "Richmond," and care should

be taken that each is made level with the gum on the labial side. Hard gold or platinum tubes are next soldered to them in lieu of the ordinary posts of single "Richmond" crowns. The fixing of these with cement in their proper positions, and the operation of sealing the apical ends with gold or amalgam, complete the preparation of the roots. They are then ready to receive their posts. A Melotte die of each molar is next taken, and a gold collar made to fit it. This collar is notched on its anterior surface to suit the corresponding depression on the same surface of the natural tooth; the band is put on the Melotte cast, and a piece of No. 30 pure gold is placed over the crown and burnished to fit its upper surface and the floor of the notch referred to. When this is soldered to the collar, it gives an all-gold crown without cusps. A pure gold cap is next struck up and filled in with coin gold; it is ground level on its under surface, and is in turn notched at the same part as the gold crown already made. Having adjusted it to the latter, solder together, and you have an ordinary all-gold crown, plus the recess on the crown and anterior surface.

These crowns are cemented upon their respective teeth. Posts with bent ends are now placed in the cuspid tubes and allowed to project from them about three-eighths of an inch or more. A plaster impression of the whole is now to be taken; the pins will come away in it if the direction of the cuspid tubes has been carefully considered. (Before casting the impression, slip a small piece of metal tubing of such a size as will exactly fit the posts, over each; this will prevent any alteration in their direction when they have to be withdrawn and replaced in their sockets during the making of the bridge.)

Having cast, opened, and hardened the model, proceed to make the clasps for the fixed molar crowns, as follows: First take a Melotte die of each tooth and cut a pattern, being careful to leave a portion of it high enough above the level of the tooth to permit of its being bent down and accurately fitted into the notch. The clasp is next fitted to the tooth, and the high portion is thinned down with a file and punched till it fits into the depression as just indicated. It is now strengthened and contoured to the normal shape of the crown, by the addition of pieces of hard gold soldered together with 21-carat solder. This forms a strong partial cap or spur, which bearing on the gold crown, prevents the bridge's settling too hard upon the gum. It is better to make the band and spur from one piece of metal, than to solder the spur to the band when fitted, for by the former way the continuity of the metal is unbroken. The clasp must be prolonged posteriorly to grasp the distal surface of the

crown, in order that any tendency on the part of the tooth to backward movement, by pressure on the spur (which will thus act as an inclined plane), may be prevented.

Now proceed with the swaging of the plate, which is made of two thicknesses of metal. Make the first one No. 24 gauge and about five-eighths of an inch wide all around. It must be struck up sharply and made to cover the cuspid caps. Next take a piece of plate, No. 26 gauge, and a trifle narrower than the first, and strike it over the latter, when fitted, solder the two together with 21-carat solder, and trim to shape the thick single plate thus produced. After having seen that the plate fits, drill it through opposite each cuspid tube to receive the posts, which are introduced into the tubes and allowed to project through the drill-holes on the lingual surface. Now adjust the clasps, and place a little plaster round them and the cuspid posts. When it has hardened, remove the various parts from the model, stick them in their respective places, invest, and solder with 20-carat.

When bands and pins have been soldered, try the bridge in the mouth and take the bite. Select suitable tube teeth, and fit them as in ordinary plate-work.

If the cuspid tube tooth posts be thicker than the size of pin wire, they are to be reduced by the file to suit the porcelain teeth.

Modification of this method can be used in the construction of any removable tube-tooth bridge. The point to be most noted is the treatment of the molars, a plan which can be adapted to suit any of the posterior teeth. It most surely prevents the "settling" of the denture and the tendency to movement on the part of the natural teeth.

Fixed Bridge-Work.—Fixed bridge-work offers but a limited scope to English tube teeth, for they can as a rule be used as substitutes for the masticating teeth only, for reasons which render useless the adaptation of Logan, Bonwill, and other all-porcelain crowns to like purposes. The idea must not be formed, however, that tube teeth can never be used here. In point of fact, they can, but on account of the shape of a front tooth which necessitates a short and weak lingual surface, often to be further destroyed to accommodate the bite, it has always seemed to me inadvisable to use them except in a few exceptional cases, where the bite of the lower teeth strikes abnormally far in. Here they may safely be applied. The kind of case in which a fixed bridge with English tube teeth answers admirably, is one where a gap in the dental arch extends from the wisdom-tooth to the first bicuspid. The first bicuspid is banded and capped, and a pin (which acts as post both to

the root and tube crown) is soldered through it. A gold crown is fitted to the wisdom-tooth, and a strong oval-shaped 22-carat gold bar is made which will connect the crown and cap and ultimately carry the teeth. This bar ought not to rest on the alveolar ridge, but must be about one-sixteenth of an inch from it, and its angle with the alveolar border ought to be such a slope downward from the lingual to the labial side as will secure a perfect self-cleansing space. The anterior end of the bar must now be soldered, not only to the bicuspid cap, but also to the base of the post itself, so that the strain may be borne by both. So far, then, the bar and bicuspid cap are in one piece, the molar crown remaining unattached. Place these in their relative positions in the mouth; do any adjusting that may be necessary between the molar crown and the posterior end of the bar; take them off with plaster as just described in this operation in plate bridge, and solder. A bite must now be taken, and the teeth set up on the bar in the usual way, being fitted to it and allowed to overhang its buccal edge. When the teeth have been cemented to place with sulfur, the bridge had best be fixed temporarily in the mouth till it has proved satisfactory, when it may be fixed. A fixed bridge like this may be inserted on either side of either jaw, and modified to suit such exigencies as intermediate roots, etc.

It must not be concluded that the possibilities of tube work have by any means been exhausted in this essay. They are at once seen to be limited by the fault in construction of the front teeth mentioned previously.

A point of great moment to the tube worker is the alloys of gold for posts. In plate-work these are made by English dentists about eighteen carats fine. This comparatively poor grade of metal is good enough for plate-work, but in crown- and bridge-work something finer is required. For these the qualities most to be aimed at in alloying are toughness and non-liability to tarnish. Color as indicating purity is of no importance. From experience the author recommends the use of English coin gold alloyed with from $1\frac{1}{2}$ to 2 dwt. of platinum to the ounce, for *all pins, posts, plates, and bars*. This alloy is so infusible as to admit of soldering with coin gold twenty-two carats fine.

The use of sulfur as an agent for fixing teeth on plates and bridges is strongly advocated. Excepting where it cannot (from its very nature) be employed, sulfur is far and away the best material. It will stand in mouths which are death to the very best cements, because none of the oral fluids destroy it. Again, when repairs have to be done, where cement has been the fixing medium, the teeth can only be removed with great force by pliers, obviously a very unsafe

proceeding. Indeed, if the pin and tube have been well roughened, the teeth cannot be, in many cases, got off without fracturing them. By the use of the agent advised, all this trouble is prevented, for when the plate comes to be prepared you have only to heat it carefully and gradually till the sulfur melts, when the teeth may be easily lifted from their pins, and refixed when the repair is effected.

It may be objected by some hypercritical individual that the appearance of the pins on the coronal surface of tube teeth seriously affects their value prosthetically. This, if objected to, may be overcome very easily. Having cut as much off the pin as you think fit, without impairing its function as a support to the tooth, take a white glass or porcelain rod of proper size, and insert a piece of it in the tube over the pin. This ought to be done before the teeth are finally fixed, so that the section of glass or porcelain will be firmly held by the sulfur. When finished, the most critical observer will hardly detect any break in the color of the crowns if the inlays have been well matched.

To dentist and to patient the tube tooth yields such results as cannot be got from any other substitute. What more can an operator wish, when he has presented to him for use a tooth, differing essentially from the natural one in but one respect—that it does not live? What more does the patient demand than that having his dental apparatus restored as far as utility is concerned, he is at liberty to laugh and chat to his heart's content, without betraying the fact that he owes his perfect comfort, not to nature, but to art? It is no exaggeration to say that in the use of the tube tooth such a happy state of things is realized. It is my opinion, formed on long experience, that, were these teeth to once gain a footing in bridge-work, they would immediately find favor with all men who devote themselves to that department of our profession. The methods available to the prosthetic dentist are neither so complete nor so many as to be above improvement, both intrinsically and numerically, and in the interest of advancement I confidently recommend to you the English tube tooth.

After the reading of this paper, and before its discussion, Dr. Shepard called Dr. Lyon to the chair. Dr. Lyon introduced Dr. Marshall, the treasurer of the Congress, who stated that the number of foreign guests registered is 115; Americans, 982: making a total of 1097. The amount contributed so far is \$13,231.95.

The chairman then introduced Dr. Bryan, of Basle, Switzerland.

DR. BRYAN. I am glad of the opportunity to thank the dentists of Chicago, and the administration of this Congress, as well as the

committees, and those who have so generously provided for our entertainment here, and so hospitably received us. I think all the foreign members will join me in thanking you, and expressing our gratitude for the success of the Congress.

THE PRESIDENT: We will proceed now to the next paper, entitled "Hypnotic Suggestion as a Dental Obtundent and Sedative," by Dr. Thos. Fillebrown, of Boston.

DR. FILLEBROWN: I wish to say just a word of prelude, to show the gradual development of the scientific thought on this subject. About six years ago there was a paper offered on this subject and its remedial effects, to the British Medical Association, and it was refused admission. About four years ago there was a paper presented on that subject by one of its members, accepted and read before the proper Section. On the day it was read, all the other Sections of the Association were deserted, and that Section was over-crowded. All these years, up to a year ago, the *British Medical Journal* spoke derisively of the application of hypnotism to medicine. About a year ago there came out in its editorial page a statement like this: "Hypnotism has come to stay. It is deserving the attention of every thoughtful scientific man." How is it in our own country? Last year, at the American Dental Association, there was a volunteer paper presented on that subject to the committee. Under an old, almost obsolete rule, it was ruled out. It was not pressed, and consequently was not heard from. To-day, the subject is chosen for the World's American Congress as the one from America which is most likely to interest the largest number of persons, and the attendance to-day shows that the members of the World's Columbian Congress fully back up the decision of the committee.

In five years from this time, the practice of every intelligent dentist in this country, aye, in the whole land, will be governed by the principles of hypnotic suggestion.

Dr. Fillebrown then read his paper as follows:

HYPNOTIC SUGGESTION AS AN OBTUNDENT AND SEDATIVE.

It has fallen to my lot, I believe, to first observe that suggestions made to a patient during the wakeful state and during the light degrees of hypnotic sleep are sufficient to produce insensibility in dentine, and also the first to demonstrate its application to the practice of dentistry. Many years ago it was demonstrated that in the very deep hypnosis which obtains with a very small percentage of patients, the anesthesia was sufficient to operate on sensitive dentine without pain to the patient, to extract teeth, and to perform minor and major

surgical operations without the patient's knowledge. But I know of no record that suggested anesthesia during light hypnosis which leaves the consciousness unaffected and the mind alert have ever been made useful and available as a dental obtundent. In March, 1892, I accomplished this, and in April announced the discovery to the American Academy of Dental Science, Boston, and in the following June I read a paper upon the subject before the Massachusetts Dental Society which was subsequently published in the *Dental Review*, September, 1892.

For thirty years I have been familiar with the remedial effects of hypnotic suggestion, and was fully convinced that hypnotism would be eventually made valuable for use in dentistry, but it was not until I had made Bernheim's Suggestive Therapeutics an object of thorough study and reflection that the way opened for me to apply it for this purpose. My successful results were a joyful surprise to me, and have proved a great solace and relief to my patients since. And with me it is at the present time a well-recognized resource of relief for hypersensitive patients and a reliable obtundent for sensitive dentine. By its use I have rendered painfully sensitive dentine anesthetic and formed the cavity to my full satisfaction, all the while the patient being fully conscious of all that was going on and fully realizing the obtunding effect of the suggestion.

The sedative effects of suggestion have also proved most salutary and efficient, and in most cases relieving the patient entirely of the terror which is so often the greatest hinderance to a successful operation. Patients who for years have been unable to sit in a dental chair have had their fears removed and repeated operations performed without suffering, and at the close of each sitting have left the chair in a better condition, mentally and physically, than after the previous visit. A case in my practice this spring well illustrates the sedative and assuring effect of hypnotic suggestion.

A lady about fifty years old, had, when a young girl, a pulp exposed, and her dentist had sought to remove it by immediate operation without any obtundent. The shock nearly paralyzed her. She said that for a few moments she thought she was dead. Since then she has suffered such terror that it has been almost impossible for her to have any dentistry done, being ill after every visit to her dentist. Consequently she had lost many teeth, and needed much crown and bridge-work, and also several fillings. Knowing of my success with suggestion, she came five hundred miles to experience its benefits. She sat down in my operating-chair dejected, depressed, terror-stricken, her extremities cold. Cold perspiration was standing out on her forehead, and her pulse rapid and weak.

I hypnotized her in the first degree, and suggested relief, and in five minutes all fears were removed, her physical functions were restored to their normal condition, and she was enjoying a sense of comfort, and able to bear the grinding of teeth with a corundum-disk without disturbance; and by successive repetitions of the hypnosis and suggestions she was able to occupy my chair over twenty-one hours within six days and improve each day, and on her return was able, as she wrote to a friend, "to at once answer her accumulated correspondence, instead of going to bed as usual after a dental operation."

At one sitting she wished me to examine a tooth. As it was pulpless and not sore, I thought to examine it without hypnotic suggestion; but as I had not suggested as to this special tooth, her old terror returned, and she was utterly unable to let me proceed. I hypnotized and suggested relief, and her fear was gone, and I completed the examination without trouble.

One other case illustrates the lasting effect of suggestion over fears of more recent origin.

A young lady, twenty-two years old, had, a few weeks before her visit to me, undergone an attempt made to extract a tooth. The operator did not succeed in removing the tooth, but persisted in his efforts until the patient was partially unconscious. The result was a state of great fear, which nearly disabled her during the day, and rendered much sleep at night impossible. As soon as she would fall asleep, the horror of some one wrenching at her tooth would bring her sitting upright in bed. She persisted she never could have her teeth touched again, or again take an anesthetic. Her sister finally persuaded her to see me, promising that I should do nothing without her asking. I talked with her awhile, when she consented to be hypnotized. She hypnotized quite deeply—memory gone. I suggested removal of fears and a willingness to take some ether, and absence of any dread of the extraction of the tooth. In five minutes I woke her, and immediately after answering me a question said, "I will take the ether." I immediately prepared the ether-sponge, hypnotized her again, and suggested comfort during the inhaling of the ether. I carefully administered it while she was still hypnotized. She did not seem to experience the slightest discomfort. I extracted the tooth readily, and the patient recovered without terror or distress. Before I discharged her, I hypnotized her again, and suggested good sleep without dreams or fears for the coming night. She returned home, and during the night and next morning enjoyed a peaceful, restful sleep of twelve hours, waking only once during that time. She was hypnotized again the next

day, and good sleep undisturbed by terror or dreams has been her experience ever since.

The following illustrates the effects of suggestion upon another class of cases. A married lady, about thirty-five years old, has been a sufferer for many years with rheumatism, and is consequently considerably reduced in physical strength; her nervous system has suffered especially. Her teeth have been extremely sensitive; consequently without any special or sudden shock she had come to find it impossible to have any dental operations performed, and for two years her teeth had been entirely neglected. She came to me last autumn, hoping for relief. She sat down in my operating-chair in a state of great trepidation, trembling and perspiring. She was too much excited for me to attempt to even partially hypnotize. I simply placed my hand on her forehead and requested her to close her eyes, and then audibly suggested quiet, rest, absence of fear, and confidence. In five minutes she was entirely calm and quiet. I here further suggested anesthesia of the teeth, and was able to excavate two cavities and fill with gold at this sitting, and a number more at subsequent sittings. At the close of the last sitting, the patient was in a very much better condition than at the close of the first visit.

This patient I was unable to hypnotize by aid of fixation of the gaze, but by the repetition of the method first employed, I was able to produce a suggestible condition that maintained anesthesia of the teeth and a state of comfort for the patient, and "a complete feeling of don't care," as she expressed it.

As I have longer practised hypnotizing patients, I find a large number who are better and more deeply affected by this method, and I am inclined to think that the fixation of the gaze which is so much depended on will cease to be considered so essential as it is at present.

These three cases are typical; they are especially favorable and among my most successful. Still, I have had a large number equally so to keep them company. Suggestion is not a "cure-all." Some patients cannot be made suggestible. The teeth of some patients who are hypnotizable cannot be anesthetized. One patient I have is a lad of fifteen. He hypnotizes to a state of deep somnambulism every time; the loss of memory is so complete that he has never remembered anything that I have said or done during the hypnosis, and feels exultant that he has had his dentistry done without suffering. Still I have been unable to render the dentine scarcely less sensitive apparently than when awake, and he shrinks nearly as much. This case is entirely exceptional.

While suggestion is not of universal application, yet summing up the favorable effects of the sensitiveness of the dentine and the very favorable sedative influence on the nervous system, it proves for me the most efficient dental obtundent that it has been my privilege to try. In my paper referred to, I reported an analysis of twenty-one cases showing my success. My subsequent experience has fully corroborated this favorable showing. The number of patients was twenty-one; one failed to hypnotize, consequently the summary applies to twenty patients. In every case I proved that the teeth were very sensitive. Hypnotic suggestion applied thirty-eight times to twenty patients. Full anesthesia of the dentine obtained twenty-one times for eight patients, or forty per cent. of the whole number of patients. Anesthesia of dentine not quite complete, but practically successful, twelve times for seven patients, being thirty-five per cent. of the whole number of patients. Anesthesia completed with local obtundents six times to five patients, or twenty-five per cent. of the patients.

I had successfully applied suggestion once for removal of necrosed bone, five times for extracting teeth, one tooth at each operation. Once for operation on alveolar abscess. For removal of dread of taking gas, twice, once successful and once unsuccessful. I have many times and uniformly since removed all dread of anesthesia, and also prevented the nervous fear that is likely to obtain when waking up.

It is impossible to indicate in any table all the benefit that accrued to the patient from hypnotism. In every case there was almost complete, and in most cases, entire relaxation of nervous and muscular tension, so that the patient rested during the operation instead of being exhausted. Almost every person left my operating-chair saying that he felt better than when he sat down. I always suggest that the patient is resting, will wake up freshened, and this result usually follows. If by chance a different result obtains, I at once hypnotize again and correct the error. This has occurred in a few instances, but thus far I have not failed to relieve the discomfort.

Another distinct gain has been described by several patients independently, viz: When any pain is felt, it is sensed only at the point of contact with the instrument, and not over the whole system as is generally the case. If a tooth is extracted, there is no dread felt before the operation nor shock produced by it, only a little twinge felt the instant the tooth is being pulled. A worthy Scotchman expressed himself to the point after having a tooth extracted

under hypnotism, "I rather think it helped me; it kind of reconciled me down to it."

The operation for necrosis mentioned was for a patient whose nervous system was much broken down; any excitement from sorrow, fear, or joy would invariably cause her several hours of nervous excitement and distress, entirely disabling her at the time. The hypnosis prevented any unfavorable results from the operation. I do not presume to rely on suggestion as an anesthetic for the extraction of teeth. I occasionally try it for one single tooth, and if the patient willingly opens the mouth and submits to the operation, I feel sure of success. I have never tried it for more than one tooth at a time.

The Caucasian race in the temperate zone does not seem to hypnotize as deeply nor accept the suggestions as implicitly as do the Eastern races of the torrid zone. Still I find many patients suggestible without any attempt at hypnosis, so that by simply verbally assuring the patient that the dentine is anesthetized, it can be cut without the patient suffering. By the same means fears will be removed, the palpitating heart stilled, and a feeling of repose and quiet made to succeed a storm of excitement. In one case I reduced the pulse twelve beats in less than three minutes, and removed just as quickly what seemed insuperable fear of an anesthetic. This is only a repetition of similar experiences of other hypnotists; it is only utilizing one of the elements of the human mind which has come to be well understood by all students of mental philosophy. The power to use this agency of suggestions either in a wakeful or hypnotic state is not, as many supposed, confined to a few, nor is it any special gift; it is one of the faculties of the mind, and much in the same sense as is the mechanical, mathematical, literary or artistic ability.

The average man can become a capable hypnotist, and at least three-fourths of the practitioners of dentistry may by proper study and application make it exceedingly useful. I had occasion recently to instruct some young dentists in the art of hypnotizing; six sat down, two at a time as subjects, and another six became operators. Four of the operators were entirely successful, and fully hypnotized their subjects. The last two failed of complete success for lack of time, which caused a hurried feeling which is inimical to any approach to the hypnotic condition. Any one of good understanding and fair ability can use the elements of suggestion in a form taught by the Philosophy of Repose or the so-called devitalizing process. Several of my patients have attained to the power of auto-hypnotization by the practice of those methods, and have ren-

dered their dental operations comparatively painless. Also some of my professional friends have found themselves able to give their patients great relief by suggesting this method while operating upon their teeth.

There is no fear among patients or operators to prevent the practice of this, and it will eventually prepare the way for the more potent suggestion under the hypnotic condition. At present, prejudice and fear begotten of ignorance and misinformation prevent the dental profession from obtaining the benefits following the use of hypnotic suggestion. Consequently it is fortunate so much benefit can be obtained by the less-pronounced forms which commend themselves to the most timid.

The fancied dangers attending hypnosis have a great influence in preventing its use. The real dangers are few, and wholly avoidable. Liebault says, "The accidents in hypnotism are wholly due to the ignorance or giddy tricks of the operator." And Moll affirms, "It is insufficient technical knowledge that is dangerous, not hypnotism. Hypnotism properly used is as harmless as electricity properly used." No danger or ill effect ever accompanied or followed its administration by a reasonably competent and honest operator.

The condition itself is not in the least dangerous. The patient is put into a quiet sleep, being light or deep as the susceptibility of the subject may determine. The patient is comfortable and resting, and if left alone will usually in fifteen or twenty minutes wakes spontaneously as from natural sleep. The hypnosis wears out. The patient may feel drowsy for some time longer, but soon returns to the former condition of wakefulness, but the quiet, calming influence of the hypnosis is sure to remain.

No sensible man will deny that harm may be done with hypnotic suggestion. There is "nothing good under the sun" which may not do harm or become evil by misuse. The commonest blessings of air, water and warmth become in the tempest, the flood, and the conflagration, the greatest evils. Nutritious food becomes a bane to the overloaded stomach, and heat and moisture produce a pestilence from the bounteous products of the soil.

Anesthesia often produces direful results, yet it is a wonderful blessing, so like Juliet's wine that,

"Through all thy veins shall run
A cold and drowsy humor, which shall seize
Each vital spirit; for no pulse shall keep
His natural progress, but surcease to beat;
No warmth, no breath, shall testify thou liv'st;
The roses in thy lips and cheeks shall fade

To paly ashes; thine eyes' windows fall,
 Like death when he shuts up the day of life;
 Each part, deprived of supple government,
 Shall stiff, and stark and cold appear like death,
 And in this borrow'd likeness of shrunk death
 Thou shalt remain full two and forty hours,
 And then awake as from a pleasant sleep."

In predisposed cases chloroform, ether, and gas have caused sickness, insanity, and death. Yet every surgeon uses them, and every patient expects and desires them. Opium and alcohol are also dangerous, a thousand times more dangerous than suggestion. They do their evil when used for good purposes by innocent and well-intentioned persons, and have usually done their work before the victim or physician is aware of it; but hypnotism can do no harm unless the ill result is carefully planned and knowingly and deliberately brought about. An operator that could do this is basely vile, and can hardly be found in any branch of the medical profession.

Suggestion will cure headache, and it will also cause it. Suggestion will relieve tonic contraction of the muscles, and it will also cause spasms of the same organs. Suggestion will stimulate to elevating thoughts and mental activity, and it will induce mental inactivity and excite debasing imagination. It has been said hypnotism ought not to be used until better understood. Upon that premise no man could think another thought. For there is no understanding of even how a thought is produced, nor do we understand any mental process; we only know what we observe of the mental phenomena.

No competent operator need have any fear for himself or his patient. Average ability, fair knowledge of the subject, and honesty are sufficient safeguards for both the operator and his patients. It is said the rash, foolish, and unprincipled may abuse it. True. But this is all the more reason why the conservative, wise, and high-minded physician should snatch it from such unworthy hands.

I do not believe in letting the devil have a monopoly of all the valuable things in this life.

Not many years ago anesthetics were used to make ludicrous exhibitions of persons for public entertainments; yet no one on that account refuses to use them to assuage the agonies of a painful operation.

The rash, foolish, and unprincipled have used hypnotism for many years, and to-day use it to make amusing and profitable entertainments; but this is no reason why suffering humanity should be denied the blessings of the remedial effects of this won-

derful curative agency. To me it is a wonder that fifty years ago scientific men should have been so blind as to have given it over so completely into the hands of the unprincipled and uneducated classes.

While it is true that extreme cases have been found where control was obtained and violence done to the subject, it must be remembered that the patients in every case know what is said and what is done, and also what they do. In a few cases only the memory does not bridge over from the hypnotic condition to the wakeful state, or the conscious self does not take sufficient cognizance of what is said and done to retain the impression. Now, as the somnambulistic state obtains in hardly one patient in ten, it would require a hardihood beyond compare or an ignorance beyond conception to presume upon it.

The propriety of witnesses being present when the operator and patient are of the opposite sex, no one will question; but the necessity of it is greatly exaggerated. Nearly ninety per cent. of the patients are protected by their exalted perception and full consciousness, and the rest by the almost certainty of being aroused by any suggestions against their convictions. In the exceptional cases, the operator needs the witnesses for his own protection against designing patients, rather than the patient against him.

It is generally considered that hypnotism is not the best name for the suggestible condition which we are considering, but it has become so firmly fixed that it is useless to attempt any change or substitution.

Generally persons do not sleep in the ordinary sense of being unconscious, as in sleep at night. In the hypnotic condition the patients are fully conscious, their faculties are keenly alive, and their perceptions more acute than when in their usual wakeful state. Still, the conditions of the nervous system are radically different.

We have said hypnotism is a misnomer, yet no one has suggested a better name. We call it sleep to induce it, and we call it sleep to continue it, and we call on the patient to wake when we wish to terminate it; hence it must be considered sleep, though in most cases not inappropriately conscious sleep. It has the quality of sleep.

The induction of hypnosis is a simple and easy matter. I use the method which has proved so successful with the Nancy school and described substantially as follows by Bernheim:

"When I have banished from the patient's mind the idea of hypnotism and the somewhat mysterious fear that attaches to that unknown condition, above all when he has seen patients cured or

benefited by the means in question, he is no longer suspicious, but gives himself up. Then I say, 'Look at me and think of nothing but sleep. Your eyelids begin to feel heavy, your eyes are tired. They begin to wink, they are getting moist, you cannot see distinctly. They are closed.' Some patients close their eyes and are asleep immediately. With others, I have to repeat, lay more stress on what I say, and even make gestures. It makes little difference what sort of gesture is made. I hold two fingers of my right hand before the patient's eyes and ask him to look at them, or pass both hands before his eyes, or persuade him to fix his eyes upon mine, endeavoring at the same time to concentrate his attention upon the idea of sleep. I say, 'Your lids are closing, you cannot open them again. Your arms feel heavy, so do your legs. You cannot feel anything. Your hands are motionless. You see nothing, you are going to sleep,' and I add in a commanding tone 'Sleep.' This word often turns the balance. The eyes close, and the patient sleeps or is at least influenced."

Many persons, as above stated, are influenced at the very first seance, others not until the second or third. After being hypnotized once or twice, they are speedily influenced. It is often enough to look at patients, to spread the fingers before the eyes, to say, "Sleep!" and in a second or two, sometimes instantly, the eyes close and all the phenomena of sleep are present. It is only after a certain number of seances, generally a small number, that the patient acquires the aptitude for going to sleep quickly.

Some people can be hypnotized with chloroform before they are really under its influence. All surgeons have seen patients go to sleep suddenly without any period of excitement, after a few breaths of the anesthetic, and before it certainly has done its work. In some cases the hypnotic sleep thus comes before the anesthesia. If it is deep enough to cause complete anesthesia, as I have seen it, the operation can be performed without delay: if not, I keep on giving chloroform until the anesthesia is complete, which takes place more rapidly because aided by suggestion. By acting in this manner I also prevent the period of excitement in these cases.

It is wrong to believe that the subjects influenced are all weak-nerved, weak-brained, hysterical, or women. Most of my observations relate to men, whom I have chosen on purpose to controvert this belief. Without doubt, impressionability varies. Common people, those of gentle disposition, old soldiers, artisans, people accustomed to passive obedience, have seemed to me, as well as M. Liebault, more ready to receive the suggestion than preoccupied people, and those who often unconsciously oppose a certain mental

resistance. The idea of being hypnotized must be present; the patient must submit entirely to the hypnotizer, using no cerebral resistance; then, I repeat, experience shows that a very large majority of people are easily influenced.

I have, I believe, verified all the phenomena observed by Bernheim as to the symptoms of hypnosis, and nearly all of his variations of methods of inducing it. I, myself, use my eyes more for a fixed point for the patient's gaze than the fingers. I find it more agreeable to the patient. It seems to them more sensible, and unless the operator is likely to be hypnotized himself it is, I think, the better. Laying my hand on the forehead and over the eyes to close them, and exclude the light, is very successful with me and much preferred by many, and very often is more effectual. In these cases audible suggestion is used, same as in others.

I find the fixation of the gaze much less necessary than formerly, and now by no means essential. The awaking from the hypnotic sleep may be instantaneous. In my experience the patient will wake up from light sleep any time when I leave him for a moment, unless I particularly suggest a continuance of the sleep; but the majority of subjects left to themselves sleep on for several minutes, for a half-hour or even one or more hours, when the sleep will terminate spontaneously.

For most patients the simple suggestion "Wake up" is quite sufficient to terminate the condition. Occasionally it may need to be repeated perhaps a little more emphatically. If the arousing is sluggish, fanning or blowing on the face is useful, with the command "Wake up" repeated. A slight shock, or a slap on the arm, will quicken the termination of the condition. No hypnotist of good technical knowledge has ever had any difficulty in arousing the patient from the hypnosis at will.

An important question for dentists is, How to maintain the hypnosis and induce the anesthesia of the dentine while operating on the teeth.

I have found that all writers upon the subject, as far as I could learn, state that pain would always wake the patient from the hypnotic sleep, unless such patient was in a somnambulistic condition. I felt it might be possible to derive distinct benefit in the lighter stages if they could be kept continuous. I soon believed it possible, and after diligent study I commenced to hypnotize, and my first effort proved a success, the patient reaching the second stage. And then I made the discovery that continuous suggestion makes it possible to keep a patient hypnotized, and the dentine wholly or partially anesthetized for a full preparation of the

cavity during the light sleep of the first and second degrees. I am not aware that this has ever been made successful before.

I maintain the hypnosis and the anesthesia by a constant repetition of "Sleep, sleep; you are resting, you are not suffering, you are not dreading it, you do not care for it, sleep, sleep," and so on continuously as long as the condition is desired. It is practically a continual rehypnotizing to offset the continual waking caused by the cut of the instrument.

Sometimes the hypnosis will wear out in spite of continual suggestion, especially if the operator's attention is too wholly absorbed in the operation and his suggestions become weak. In such a case I stop, and hypnotize again. I have hypnotized as many as six times at one sitting.

If the sitting is long and the hypnosis deep, the patients are likely to get tired, and I have found it better to wake them up at intervals for rest, or suggest a change of position, but the waking is much better. By making this conservative use of hypnotism, the patient in every instance will feel rested and stronger at the close of the sitting than before, and will improve in courage and quiet as the sittings succeed each other, and in many cases the need of hypnosis will cease to exist and the patient submit to the operation in the wakeful state without shirking.

I had a case lately that illustrated it. A girl fourteen years old had feared dental operations so much that for two years she has not been able to have her teeth even cleansed. Hypnotism made cleansing, preparing, and filling easy, and at the fourth sitting she had become so indifferent that she was quite willing to have a large cavity in a molar prepared and filled while fully awake. Others have experienced the same benefit.

These results have, it seems to me, proved that in my hands hypnotic suggestion as a sedative and as an obtundent, is a marked success, and I believe equal and greater successes may be achieved by many other operators when they make intelligent effort to accomplish this desired end.

The physiology of any mental state or mental action is but little understood beyond a familiarity with the phenomena displayed. We are no better nor worse off with the hypnotic condition. The phenomena of hypnotism has been observed scientifically for more than one hundred years, and many facts established.

Mesmer, in 1778, announced the discovery of producing this condition at will, and announced his theory of animal magnetism.

In 1841, Dr. James Braid described this mesmeric state, and called it hypnotism, and placed the subject on a truly scientific

basis, and definitely established the fact that suggestion was the sole cause of the condition.

Braid proved that no magnetic fluid exists, and that no mysterious force emanates from the hypnotizer. He further proved that the hypnotic state and its associated phenomena are purely subjective in their origin; and this origin is in the nervous system of the subject himself.

Braid's suggestions were based upon the expectancy of the patient; hence there was less certainty of benefit than exists at the present time.

In 1860, Dr. Liebault, of Nancy, commenced the use of hypnotism, and soon discovered that audible suggestions addressed to the patient heightened the effect and made the results more uniform and certain.

This is now the almost universal practice. It seems established that hypnosis is entirely free from danger, and its effects upon the patient if left undisturbed are the same as ordinary sleep.

The great essential feature of hypnotism is not sleep, but a heightened receptivity of suggestions with or without sleep; in other words, any suggestion offered to a person during hypnosis has an exaggerated effect on the mind. But up to a certain point, that of lethargy, the deeper the sleep the greater the effect of the suggestion.

In hypnosis the power to initiate any volition is in abeyance. The mind will be directed from the old channels and follow a new line of thought; it will exert its physiological force as directed by the operator.

The mind seems to become non-resistant, and old thoughts are held in abeyance and new thoughts are suggested and received to hold control, so that sometimes during a single hypnosis, a condition directly opposite to that which previously existed may gain permanent control. Courage may succeed fear, rest replace fatigue, and sweet natural sleep come to the patient instead of wakeful hours of restlessness.

Liebault's idea is that "ordinary sleep does not differ from hypnotic sleep. The one is, like the other, due to the fixation of the attention end of the nervous force upon the idea of sleep. The individual who wishes to sleep, isolates his senses, meditates, and remains motionless. The nervous force concentrates itself, so to speak, at one point of the brain upon a single idea, and abandons the nerves of sensation, motion, and special sense."

"But the ordinary sleeper is in relation with himself only, and as soon as consciousness is lost, the impressions conducted to his

brain by the nerves of sensibility or of organic life may awaken diverse memory-sensations or images which constitute dreams. These dreams are spontaneous, that is to say, suggested by himself.

"The hypnotized subject falls asleep, with his thoughts fixed, in relationship with the hypnotizer; hence the possibility of the suggestion of dreams, ideas and acts, by this foreign will."

I close this part of the subject with a statement of the theory of Despine, which seems to me founded upon clinical observations. "There exists," says this author, "an automatic cerebral activity which manifests itself without the occurrence of the ego; for all nervous centers possess in accordance with the laws which govern their activity, an intelligent power, without any ego, and without personality. In certain pathological cerebral states the psychical faculties may manifest themselves in the absence of the ego, of the mind, of consciousness, and may give rise to acts similar to those which normally are manifested through the agency of the ego. This is automatic cerebral activity. That which manifests the ego, on the contrary, is conscious cerebral activity. In the normal condition, these two activities are intimately bound together, they are but one, and always manifest themselves conjointly; in certain pathological states they may be separated and act alone. Hypnotism is characterized physiologically by the exercise of the automatic activity of the brain during the paralysis of its conscious activity."

That you may see my progress in the art of hypnotism, and better understand the anesthetic effects of hypnotic suggestions, I give the following description of cases in my practice in the order in which they followed each other.

Case 1.—In 1892, my first attempt to hypnotize for dental purpose was for Miss L., age twenty-two, to remove a pulp after arsenic application. She hypnotized in about one minute to the first degree; very light sleep. I suggested anesthesia of tooth and pulp. It lessened the pain very much; but I could not overcome all the sensitiveness of the pulp, nor have I been able to do so since in any case. A month later I hypnotized and suggested for relief of toothache and restfulness, as she was very weary. I awoke her in five minutes, and found her toothache gone and herself feeling entirely rested and refreshed.

Case 2.—Mrs. L., aged thirty-six. I induced only very slight sleep. I suggested for anesthesia of sensitive dentine. The pain during the previous operation was almost unbearable. They relieved sensibility very much. It made the cutting of two cavities on buccal surface of inferior bicuspids with both excavator and bur very

easily borne. The suggestion did not last long, and hypnosis and suggestion had to be repeated several times.

Case 3.—Miss C., aged fifty. The patient was suffering from necrosis from abscess on right superior incisor. Her upper teeth had been all extracted five months before. The patient had nervous collapse seven years before, and has since suffered repeated attacks. Any excitement of sorrow, or joy, or fear, or a pleasant hour with callers, would bring on a nervous spasm which would last one or two hours. Ether had an unpleasant effect upon her, and she preferred the operation without an anesthetic, on account of nervousness. I hypnotized her to the first degree, bordering on the second; I also applied cocain to the gum; I then incised and removed a section of the gum: trephined the alveolar wall and removed spiculæ of dead bone. The operation lasted from seven to ten minutes. The patient lay quietly, scarcely flinching, her dread all gone, and upon waking up she pronounced herself comfortable during the operation, suffering no shock, depression, or weakness.

I did not think to suggest against subsequent pain, and some pain persisted in region of the wound, also in her temple and ear of same side. I hypnotized her the second time, and relieved the pain in wound and face. I waited twenty minutes, thinking the rest of the pain would subside; but the pain in her ear persisted. I hypnotized her the third time, and suggestion relieved the pain entirely, and the patient left my office feeling in very much better condition than before the operation. I saw her six days after; she had been getting along well, the wound was healing well and her nervous condition good: had some neuralgia of the head, face, arm, and hand. I hypnotized her, and suggestion relieved the pain entirely. Three days after this she had had no return of pain in the arm or hand, had suffered a little pain in the head. Hypnosis and suggestion relieved it again completely. At 4.30 called again. She had been very busy during the day out in the wind, and tic of right temple had returned and involved the eyes. I hypnotized twice, and completely relieved the trouble. The patient left town the next day, but subsequently I saw her and found relief from the pain proved permanent, also the general good effects of the hypnotism continued.

Case 4.—Mrs. P., age forty-five. Right superior first molar abscessed. The crisis was past, but the tooth was very sore, the dead pulp remaining. The tooth needed drilling for removal of pulp. The patient dreaded the operation very much; she did not sleep the night before on account of it, and had a bad headache and neu-

raige pains over the entire system. She hypnotized to the second degree; her dread was entirely gone. She suffered scarcely any during the operation; she was very comfortable and did not mind it at all; her systemic pain was also cured. I filled her tooth temporarily and hypnotized again, and suggested recovery without further trouble.

Four days after, I found her tooth in good condition, and filled it permanently; I hypnotized, and suggested for continued health of tooth and system. The tooth has since remained well.

Case 5.—Prof. O., age thirty-five. Right inferior first molar needed to be extracted, as it was very badly abscessed. I hypnotized him to the first degree, and suggested that pain of extraction would be lessened, his dread removed, and shock prevented. The result fulfilled the prophecy.

Two weeks later he had a right superior bicuspid root which he had wished out for ten years, but could not get up his courage. I hypnotized to note effect on his mind; he soon opened his mouth without dread; I extracted the tooth; he said he felt no pain, only a little wrenching sensation, which was only local. He called it perfectly successful.

At another sitting I excavated and filled the right inferior lateral and cuspid; these were very tender indeed. I hypnotized him, and suggestion relieved sensitiveness very much, and with a local obtundent added I made the anesthesia complete. The patient said the pain was only local; did not disturb the system. He found it a great relief.

Case 6.—Dr. P., dentist, age thirty-four. I filled for him a right superior cuspid, labial cavity, exquisitely tender. He was unable to bear his finger-nail on it. I hypnotized him to the second degree, light; suggestion made the anesthesia of the dentine almost complete; the nervous and muscular relaxation was entire. I used excavator freely, and burred with engine all round the cavity, and in twenty minutes from the time he sat in my chair the cavity was prepared. He found it a complete success. I subsequently filled for him a right superior cuspid, mesial cavity, not tender; I did not hypnotize him at first. When the tooth was nearly filled, he said he felt broken up and was very much disturbed. I hypnotized him; suggestion made him immediately quiet and entirely relieved his discomfort.

Case 7.—Master G., aged ten. The patient was very sensitive, and it was very uncomfortable for himself and all concerned. He hypnotized to the first degree, very light. It quieted him a good deal, and made it possible to do a little, but my success was in-

different,—largely due, I think, to lack of interest on the patient's part, whose mother had little faith in it. I hypnotized him for three sittings with about the same success.

Case 8.—Mrs. W., aged forty-three. Filled right inferior first molar, very sensitive. This patient was always very much disturbed by prospect and performance of dental operations. She hypnotized readily to the first degree, but full influence could be maintained but a little time. A drowsy feeling persisted; all dread of operation was gone; I used bur and chisel without resistance or suffering on her part. She thought it a complete success.

A week after I hypnotized her with same process as before. I could not completely anesthetize the dentine, but the addition of a little alcoholic vapor completed the insensibility.

Case 9.—Mrs. C, age twenty-nine. Condition, hypnotism, and success the same as last case.

Case 10.—Miss H. is a lady about forty. Her teeth have been always very sensitive, and for twenty years she has been troubled with insomnia; she was very nervous, excitable, and apprehensive. Her teeth were in bad condition, owing to neglect on account of fear and pain. She hypnotized to the third degree, somnambulistic; I suggested anesthesia of dentine, which was complete. I operated April 9, 12, 21, and May 7 and 16. Hypnotic suggestion at each sitting.

May 28, I gave her a short hypnosis at the beginning of the sitting, and one at the end, operating in the meantime on a posthypnotic anesthesia which was complete. This method gave relief and comfort; some of the former hypnoses had proved wearisome. The incidental benefits derived from the treatment were very marked. Up to the date of her first sitting she had often been obliged to take some hypnotic to afford sleep. The night after her first hypnosis in the afternoon, she slept all night and far into the morning, and every night since, except three or four that she had some face-ache. Her general condition is much improved, apprehensiveness much less, and nervousness much reduced, and has much better command of herself. Her improvement has persisted up to the present time (July 1, 1893).

Case 11.—Mr. M., age thirty-two. Teeth very sensitive. Hypnotized to the third degree; suggestion made; anesthesia of the dentine complete. Operated from an hour to an hour and a half at each sitting. At the close of the longer sittings he complained of feeling tired sitting so still; he thought an hour long enough.

Case 12.—Miss P., age fourteen. A refined, healthy, vigorous girl, but so afraid of dentistry that she not been able to have teeth

cleansed for two years. Her teeth were extremely sensitive. She called, upon my promise that I would not touch her teeth. I talked hypnotism to her, interested her, and made an appointment to try it and operate.

May 28, I hypnotized her to the first degree. Suggestion removed all fear, and I cleansed her teeth without any trouble, and prepared and filled with cement two cavities in the front teeth.

June 11, I hypnotized her again; prepared and filled with cement four cavities in front teeth. While excavating one of the cavities she flinched some. I feared discouraging her, and waked her and asked her if I should go ahead if it did hurt a little: she said, "I don't care; go ahead!" I hypnotized her again, and finished according to the instructions.

June 17, I hypnotized her twice; excavated three cavities and filled with gold; I used bur with engine without discomfort to the patient.

June 18, I hypnotized and prepared one tooth, waked the patient and filled it; then prepared and filled another molar while she was awake. The transformation was wonderful.

Case 13.—Miss L., age forty-two. She called on me in December, 1891, for a new upper plate. She had been wearing artificial teeth on rubber for three years. Her mouth had been constantly red, with severe itching and burning. I made her a good-fitting plate on rubber, but her mouth was no better. A few weeks later I made a gold plate, which she has worn since. It gave no relief from the burning, and the redness persisted.

June 23, 1892, she called, seeking relief. I proposed hypnotic suggestion as an experiment. She was agreeable to it. I hypnotized her nearly to second degree. Suggested cessation of burning and change of color and return to health. She slept perhaps ten minutes. On waking the mouth had changed color perceptibly, the burning had gone.

June 24. She has experienced discomfort only about one hour the evening of the 23d, and again that morning about the same length of time. I hypnotized her again, and suggested for health and comfort.

June 25. She has experienced a little discomfort once for a short time since yesterday. Mouth still better. I suggested for complete recovery. I did not see the patient again until the 29th, four days intervening. Has had hardly any burning of the mouth since her last visit until to-day, rather more. Mouth seems much improved in color and texture. Hypnotized, and suggested for relief and cure.

June 30, mouth much better; no discomfort since yesterday. Hypnotized also on July 1, 6, 7, 8, 14, and 21. July 22, her mouth has felt entirely well since June 30; it is now normal in color save two small patches which are a little red, but not at all tender or uncomfortable. The patient has worn her plate all the time during the treatment.

These cases fairly represent the extremes and average of the results in my practice of the application of hypnotism to dentistry. I believe it is a power of great value to my patients, and may be to the patients of other operators who may practice it.

SECTION I.—ANATOMY AND HISTOLOGY.

The meeting was called to order by Dr. C. P. Robinson, of Mobile, occupying the chair.

Discussion on Dr. Fillebrown's paper, entitled: "Hypnotic Suggestion as a Dental Obtundent and Sedative."

DR. ROHLAND. Are all temperaments alike subject to the hypnotic treatment?

DR. FILLEBROWN. Yes, I want to mention a little incident. We were at the Fair the other day, and at one place there was a picture which I think you may have seen. There were three views. The first represented a man with a very sober face; in the second, he had begun to read something, and his face has lightened up considerably; and in the third picture he has burst out laughing in a very hearty way. I thought there was a good chance for a demonstration, and I said to my friend who was near me: "Here is an interesting picture." And I showed him the sober face first. My friend has rather a sober face, himself. I saw him look at the next picture, and then I saw him look at the third. His face went right through the same illustration, and when he got to the third he burst right out laughing. There was no magnetism from that picture to him. What was it? It was the suggestion that picture made to his mind. You attend a theatrical performance, and see a person come along, and you remark, "What a funny-looking fellow." He may not be dressed out of the common course, but there is something about him that suggests the idea of mirthfulness, and you laugh. You see the next person come along with the appearance of sorrow, and you respond accordingly.

Who will make the best hypnotists? It is those who can suggest best. A person who is timid, ignorant, and of a different temperament, may not be able to suggest so well. If your patient be of a fine-bred temperament, and the operator is coarse and dirty, of course you will have no sympathy there; but take a person who is

intelligent, cultured, and has accurate information as to what he wants to do, is consequently self-possessed, and has all the elements that a skillful practitioner has, then he could suggest to the patient. If your patient came to you with the expectation and the wish to be hypnotized, don't you see that as soon as he enters your door he is half-hypnotized, because the suggestion rests with him, and he knows that he is to be hypnotized, and that you are the one to do it. When you come down to the point, it is very simple indeed.

DR. HODGEN, San Francisco. I have a case that I would like to place before the doctor for his opinion. In administering nitrous oxid, at one time, I had an assistant, a college student, and I taught him to operate the cylinder which led to the reservoir used for such purpose. Having filled that, I was not aware that there was some obstruction between the reservoir and the mouth-piece. I administered it to the patient, and instructed her how to inhale it, as she had not taken gas before. She passed off into the regular, ordinary phenomena which is reached by the administration of nitrous oxid, and I extracted three teeth. She was awakened from the anesthesia, and was perfectly normal, just as she would have been after the administration of gas. To my utter astonishment, upon examining the reservoir, I found she had not taken a cubic inch of gas, not a single bit of it; yet she went through all the symptoms. I would like to ask the doctor if he sees any connection between this and hypnotism.

DR. FILLEBROWN. I cannot see the connection, because it is so close that there is none. That patient was thoroughly and completely hypnotized, under the suggestion that she was to be anesthetized, and that it was to take this form, and the suggestion in the patient's mind carried it right out. I am indebted to the gentleman for speaking of this case. When you come to look back over your experience, three-quarters of you will see that you have practically been hypnotizers over a long series of years. You will find that you are in just the condition that a gentleman was who spoke to me a little while ago. He said, "Well, I have been doing just that thing right along, and did not know it." You have ignorantly practiced it, and I come here and declare to you a way by which you can use the method in a great many directions in which you have not used it before.

DR. POOR. I have had some experience in this line. I have tried it successfully in extracting teeth. There is no question as to its usefulness. Dr. Fillebrown has not said a single thing but what is applicable in practice.

DR. RELVEA, Oswego, N. Y. The doctor says he does not de-

pend on it for extracting teeth, although I think he said he had hypnotized a person in one case and then administered ether. It struck me very forcibly, and I am delighted to hear what Dr. Fillebrown has to say. There is not any one in the profession who has not found it very hard to get the patient to commence inhalation. Would not this be a good way to start them into taking the anesthetic? Hereafter, if I have that kind of a patient, I shall certainly resort to the system of hypnotizing him. Don't you depend on it at all for extracting teeth?

DR. FILLEBROWN. I use it for preparing the patients for the anesthesia. If they are calm enough, all right; if not, I prepare them for it. In individual cases it may answer for the extraction of teeth.

DR. RELYEA. In administering ether, it is very important and essential to educate your patients; first get their confidence, and then say to them, "Inhale this, and follow my instructions strictly. You may be partly conscious, but at the same time it will take away the keenness of the pain, and perhaps take the pain away altogether." Give them these instructions, and you will succeed beyond your expectations.

DR. J. O. BROWN, Chicago. Does Dr. Fillebrown find that many of his patients object to being hypnotized?

DR. FILLEBROWN. A great many do object. I make no point of it at all, if they object. If they do not want it, that ends it.

You can all do this when you get home. You can experiment on the first patient you have, whether he knows anything about hypnotism or not. Two friends of mine in Boston have had a great deal of success in this way. Say to your patient, "If you will do as I say, you will find the pain very much relieved. You feel like resting." While you are saying that, if you will watch carefully the muscular tension, you will notice how it relaxes in less time than I have been rehearsing it to you. Then go on and do just as I tell you. Do it quietly, and you may be sure that it will come about and help you wonderfully.

DR. MCKELLOPS. How many men have that power? I have paid a great deal of attention to this. It was illustrated at the Mississippi Valley Dental Association ten years ago. It is all very well for certain people to do that, but I can take any patient, and by kindness and gentleness in my operation, do anything that he does, without any hypnotism.

If you treat your patients kindly, and operate gently, you will get the same results as my friend gets from hypnotism.

Many men in the profession lack that kindness and gentleness in

operations that would make them successful. I used to use ether and chloroform to a great extent. I gave it to man, woman, and child, and I am surprised that I did not kill some of them. I gave it promiscuously, but I have quit doing so. I have done away with those things. I can, by careful operation and handling my patients with care, accomplish anything that can be done with anesthetics. I want my patient to know what I am doing. I have tried it until I have worn myself out, and I have seen all there is to be seen of this thing in this country. When the profession looks into these things, it will see that kindness will accomplish just as much.

DR. FILLEBROWN. Everybody in this world will find some other body that will be influenced hypnotically by him. I know that Dr. McKellops can do anything that I do. If there is any man on earth who hypnotizes his patients, it is Dr. McKellops. That is one of the surest ways of hypnotizing. Dr. Liébaud was asked once how he cured his little children. He said, "All I do is take them in my arms, lay my hands on them, and they are cured."

Another excellent point he has made is, that practicing the art of hypnotism helps you. It forces you to kindness. No man can practice hypnotic influence or suggestion, unless he is kind and moderate, and careful with his patients, and that is one of the greatest lessons we learn. Dr. McKellops evidently did not take in the point of my paper. Hypnotism and McKellopsism are synonymous.

DR. C. P. PRUYN, Chicago, Ill., said that forty or fifty years ago this subject was prominently before the public, but it fell into incompetent hands, so that of late years it has been all that a man's reputation was worth to take it up. The speaker felt sure that Dr. McKellops had practiced it for years, but he called it kindness. If it is tried and failure results, it is because the operator has not confidence in himself. He suggested that it be used a little more carefully and intelligently.

DR. N. J. ROBERTS, Waukegan, corroborated Dr. Fillebrown's statement. He used it now, but had to do it secretly, as parents objected to their children being so treated. He mentioned cases where he had used it in cases where the patient had been unable to tolerate any treatment before.

DR. JOHN BURNETT expressed himself as convinced by practice that the treatment was of use.

DR. E. S. CHISHOLM, Tuscaloosa, Ala., said he was surprised that the subject should be so seriously discussed by intelligent men. He mentioned the case of an old negro woman who desired to have a tooth extracted. She had heard of extracting teeth by electricity,

or galvanism, and said she wanted it extracted with galvanism. They gave her in one hand an old lamp and in the other something else, and told her to hold on tightly, that the galvanism might pull the tooth. Upon applying the forceps and extracting it, she expressed herself as having experienced no pain. Also mentioned the fakirs who go about the country professing to pull teeth without pain; they use a little cocain or some such material, and if it does hurt the patient is ashamed to cry out; that is the way they do "painless extracting." He had not heard a single argument to demonstrate any science in it.

DR. J. RABE, Oakland, Cal., asked Dr. Fillebrown to give a practical demonstration. To this Dr. Fillebrown answered he was willing to do so, but that usually as in such cases the operator did not like to take a new patient and one whom he had not seen before, but he would take some one as a dummy and show his mode of proceeding.

DR. J. Y. CRAWFORD, Nashville, Tenn., thought he must be hypnotized, as he had fully made up his mind not to speak on the subject, but now he was speaking. If he could be made to believe that he could only exercise one faculty at one time, he would believe in hypnotism; but he did not believe, as one of the speakers had said, that such was the case.

He mentioned the case where a friend of his and a believer in the subject asked him to witness a demonstration. This he did, and he noticed that the person who was alleged to be under the influence put out his hand to prevent a screen on the stage from falling. Upon questioning the subject, he admitted that he was playing a part.

DR. C. R. TAYLOR indorsed Dr. Fillebrown's position, and gave instances in his own practice.

DR. J. D. PATTERSON, Kansas City, thought there was such a thing, and that he had exercised such influence over his patients; but he thought it should not be generally done, but should only be practiced by specialists.

DR. FILLEBROWN then took one of the members and showed how he proceeded to practice hypnotism, merely using him as a dummy, and not giving a practical demonstration of putting a person under hypnotic influence. His plan of work was as he had described in the paper, putting his hands on the patient's head and body and talking to him, assuring him that he was asleep and would suffer no pain during the operation.

Session then closed.

SECTION II.—ETIOLOGY, PATHOLOGY, AND BACTERIOLOGY.

Section called to order by the chairman, Dr. G. V. Black.

A paper was read, entitled "Diseases of the Palate with Reference to Dentistry; their Pathology." (Illustrated with cases.) By Vida A. Latham, D.D.S., F.R.M.S., Chicago, Ill.

PALATAL DISEASES AS APPLIED TO DENTISTRY. PATHOLOGY AND CASES.

Diseases of the palate are not so rare as is often thought by physicians and dental surgeons, if attention be paid to that part of the mouth.

The anatomical position of the palate, by its structural continuity with the alveoli and gums in front, and its connection posteriorly with the tongue and pharynx by means of the pillars of the fauces, is liable to implication by the extension of disease from these parts; whilst, on the other hand, morbid processes originating in the palate may spread to the neighboring portions of the mouth, fauces, or pharynx.

The physician sees many cases of tonsillitis, but seldom or never considers them further than the present needs of the case require.

The condition of the palato-glossal fold should always be studied in tonsillitis, more particularly in periadinitic changes.

Inflammation of the buccal tissue is not commonly found extending onto the mucous membrane covering the anterior edge of the coronoid process (the pre-coronoid space of Allen). Inflammatory action about the inferior third molar is readily transmitted to it, thence involving the soft palate. Conversely, ulcerations of the soft palate may tend to involve the tissues around the inferior third molar.

Another fold of great importance is the palato-pharyngeal. This determines the site of pharyngeal irritation, for immediately to the median side, a corrugation of the pharyngeal mucous membrane is usually met with in pharyngitis, more particularly in syphilitic angina. In the seat of ulcerations the study of these folds is also of primary importance.

It is necessary to remember that the palate, with the posterior pillars of the fauces, constitutes a septum between the nasal and buccal passages, which by contraction of the palato-pharyngei muscle becomes complete in the act of deglutition, and thus cuts off communication between the two cavities. Therefore, its structural and functional integrity is essential for perfect articulation, suction, and deglutition. The chief symptoms caused by lesions of this part are usually dependent upon impairment of these physiological acts.

The diseases of the palate may be grouped into:

I. Congenital malformations, as cleft palate, which it is better to treat by itself as a sub-division of palatal disease.

II. Inflammation.

III. Ulcers.

IV. Necrosis; and

V. Tumors.

[NOTE.—The detailed description of the several classes of palatal diseases which follow will be found in the paper as published in the Congress transactions.]

Case I.—A girl, aged eight years, on examination showed a tumor of the palate, which was not apparently the cause of pain or difficulty in swallowing. On examining the growth more closely, it was found to be about the size of a large walnut, extending from the soft palate on the right side, and projecting downward toward the end of the tongue. It was unconnected with the bone, and had a broad attachment. The microscopical slides showed small round and spindle-shaped cells in great numbers, without any definite stroma.

Case II.—A lady, aged sixty-six, consulted a dentist with reference to the fit of her plate; on examining the mouth, a nodule was found occupying the right half of the soft palate and growing forward over the hard palate, inward and across the middle line, and downward so as to touch the tongue. It was globular, soft, and elastic, almost fluctuating; the mucous membrane over it was thin and tense, not adhesive, and there were no enlarged glands.

The growth had been developing two years, lately with more rapidity. The voice was thick and indistinct, but swallowing was easy and painless. At the operation, the mucous membrane was incised and some of it stripped off; then the growth easily shelled out. It was not firmly attached, but lay loosely in the palate in a distinct capsule. Hemorrhage was free, though easily controlled by pressure. On microscopical examination, I found the specimen to be a mixed round and spindle-celled sarcoma, with much embryonic connective tissue and some imperfectly formed tabular glands.

Case III was a tumor from the hard palate of a woman aged forty-five. This was fourteen years in duration. It was small, circumscribed, and freely movable; the mucous membrane over it being smooth and natural. The tumor was easily shelled out. In structure it had a fibrous ground substance, broken up by masses of cells into curious tracts and processes with sinuous, crescentic, and indented edges, sometimes split and frayed. The cell-masses were

heterogeneous ; many large squamous epithelial cells, also cell-nests. In and around the tracts of fibrous matrix were scattered shrunken, ill-shaped cells, which suggested that this matrix and the cell-nests may have been due to degeneration or perversion of masses of cells. In other parts of the section, the cells were of glandular type, and laid down in tubules. The general aspect of this tumor under the microscope proved it to be altogether irregular and embryonic.

Case IV.—This case is of much interest on account of its rare character, for so far I can only find mention of two other cases observed in this locality. The patient, a woman aged fifty-three, blonde, excellent health, has been frequently to the dentist on account of loss of the teeth in the lower jaw (the reason for losing them being indefinite). A partial plate was made, but it never fitted well, and had always been such a source of annoyance by causing irritation of the hard palate near the alveolus to the right of the median line, that she removed the plate constantly.

About six months before she consulted another dentist, a small soft swelling appeared upon the irritated part of the hard palate behind the alveoli of the incisors, smooth and painless. As the pain increased, she came to have the remaining tooth out on the right side, and for two months the plate could not be worn on account of the growth. The pain now having increased in severity, an operation was urged, to which she finally consented. The extent of the tumor was almost to the alveolus on the anterior and external sides, and to the middle line on the inner side; posteriorly to the suture between the maxilla and the palate-bone.

The growth was flat, sharply defined, a raised surface and a rounded outline. It was uniformly firm, but not hard, of a purplish black color, and occurring in patches. There were no enlarged glands.

The operation consisted in removing the whole right side of the hard palate, including the alveolus. To give room, the upper lip was freely detached from the bone.

The growth was quite firm and black on section, almost like blood. The bone was invaded with the growth, and in the central part was absorbed to the extent of a five-cent piece.

The patient made a good and rapid recovery. The face suffered no deformity. An obturator was adjusted to the palate, and the patient articulated quite clearly.

On making micro-sections, staining with logwood, methyl blue, etc., the tumor proved to be a spindle-celled sarcoma originating from the periosteum, as the examination clearly showed. The cells

were large, with a considerable amount of intercellular tissue. No myeloid cells; mass unevenly pigmented. Pigment appeared in irregular blotches, brown in color, and deposits made up of granules of ruddy brown and others black in color. The cause was no doubt well localized, and of long-continued irritation.

It is well to note that pigment is not usually found in the human palate, but is common in many of the lower animals.

Case V.—Adenoma of the palate. The patient, aged fifty, had known of the growth for eighteen months. It passed back on the soft palate on the left side, ulcerating in the middle, and painless. The ulcer was a distinct feature in the case, and it was referred to a number of surgeons, who agreed on its being an exceptional case. A cheesy, fetid mass, such as is often obtained from tonsillar follicles, was removed from the bottom of the ulcer. In the operation the whole thickness of the soft palate had to be removed. Recovery was good. On micro-section, it showed adenoma. The fibrous tissue well seen, and seeming to form an ill-marked capsule around the periphery of the tumor.

Case VI.—Patient, a laborer, aged sixty-five. Excellent health, had a growth of one to one and a half inches in circumference, covered by healthy non-adherent mucous membrane on the left side of the soft palate. He had noticed the growth for eight months. For three months it began to increase slowly, then burst through the mucous membrane in front of the palate. The last two months it grew rapidly.

The extent was by the hard palate in front, by alveolus to the left, the middle line of the soft palate to the right, tonsils and hard palate normal. No glands enlarged, nor epistaxis. Some thirty years ago, patient had a similar growth on same part of soft palate. The operation was very extensive, and was performed by Dr. G. M. Brennan, to whom I am indebted for the specimen. The left common carotid was ligated, and the growth with the whole of the affected side of the soft palate removed, partly by knife and partly by thermo-cautery.

The tumor was encapsulated about the size of a large walnut, pinkish gray in color, and was diagnosed as alveolar sarcoma. Recovery was good.

On section, large connective-tissue cells were everywhere arranged in larger and smaller groups by closely intersecting bands of well-formed fibrous tissue. The individual cells separated by delicate fibrils with larger trabeculæ.

Primary tumors of the soft palate seem very rare. From isolated reports, it would appear that all forms of connective-tissue

growths have been met with in this region. It has been the seat of adenoid cancer, fleshy growths vaguely called myoma, dermoid and papillomatous tumors. So far, I have only been able to find four accounts of primary tumors of the soft palate, a cancer, a papilloma, a dermoid, and an adenoma.

Case VII.—Myxo-sarcoma. This is another form of the sarcoma groups, and seems the variety most frequent in this region. The patient was a woman aged thirty, who had noticed the swelling five years ago. It increased gradually to within five months of the operation for its removal, then began to grow rapidly and with severe pain. It appeared as a distinctly circumscribed, smooth, slightly undulating, firm and immovable growth, the size of a hen's egg, on the left side of the hard palate, and involving some of the anterior portion of the soft palate. There was a distinct egg-shell crackling at circumference, but none over its central part. The mucous membrane over it was healthy; no gland-enlargement. The tumor appears to spring from the periosteum, and contains a large cyst. It was diagnosed spindle-celled sarcoma, intermixed with mucus, and this was afterward proved by microscopical examination.

As regards the treatment, I will simply mention a few points worthy of attention. The chief danger in palatal operations is from hemorrhage,—the ingress of blood into the trachea, especially when the patient is under ether or chloroform. Cocain renders this danger much less, but gives another form of trouble by its uncertain action. The difficulties in differential diagnosis are many, and it requires much study to know the nature of the growths and to classify them properly, on account of their irregular morbid histology.

The second paper, entitled, "Some Facts with Reference to Dental Articulation in Relation to more or less Obscure Pains about the Mouth and Jaws," by L. Van Orden, M.D., San Francisco, Cal., was read by the secretary, Dr. Chisholm.

SOME FACTS—WITH MODELS—SHOWING THE RELATIONSHIP OF
THE DENTAL INTERARTICULATION, WITH MORE OR LESS
OBSCURE PAINS ABOUT THE MOUTH AND JAWS.

In April, 1889, Mr. W. G. L. presented himself with acute pericementitis of the left superior cuspid, which possessed dense structure, with a fair-sized gold filling upon its distal aspect. At the time, a pulp-lesion was not presumed to exist; but as it was observed that some irregularity was present, and that the occlusion was not normal, an engine-stone was used to relieve the tooth of undue work and the patient of an amount of pain that almost seemed to demand recourse to extraction. No abscess formed, and the recov-

ery was so rapid as to fix the case in the writer's mind without the aid of any memorandum. An examination of the case after four years shows no recurrence of any trouble, but discoloration seems to point to death of the pulp.

On Christmas Day, 1891, Mr. C. B., aged about forty-five years, of bilio-nervous temperament, called upon the writer at his residence, with an acute abscess pointing upon the lingual aspect of the socket of the right inferior third molar, well below the gingival margin. Temporary relief was afforded by evacuation, and at several subsequent sittings, type-writer's carbon paper was made use of and the occlusion of the tooth with the superior second and third molars rendered comfortable. By reference to these models, which are those used in illustration of Dr. Dean's paper, published in 1892 in the DENTAL COSMOS, as a reply to the paper by Dr. Davenport of Paris on the dental interarticulation, it will be observed that the right lower first molar and second bicuspid had suffered extraction some years previously. While Dr. Dean pointed out several ill effects that had seemed to follow these extractions, including noticeable cupping of the right cuspids and bicuspid and pyorrhea alveolaris of the right superior central and lateral incisors involving a loss of their proximal process to the depth of about one-half inch, it seemed probable that the forward migration of the right inferior second and third molars had given rise to slight but repeated shocks or insults to the latter tooth. The *cup* and *saucer* form of the interarticulation of the right third molars may here be adverted to: The distal edge of the saucer has seemed, in a number of cases, to be especially concerned in producing the slight shocks which resulted in such severe inflammation. Though this abscess was the third one that had formed, no other trouble was complained of by the patient until some eighteen months later, when an abscess having formed on the buccal aspect, the tooth was extracted.

A Mrs. B. had been suffering with a slight dull and quite continuous pain in the region of the left superior third molar. Several dentists had been consulted, and ascribed such causes as a "slight cavity, too small to fill," and "a dimple" (exostosis?). The tooth was slightly sensitive to percussion; the first lower molar was missing, and the cup and saucer condition of interarticulation was noticeable, and profiting by the previous case, the distal edge of the saucer was reduced and immediate relief was acknowledged.

A Mrs. D., aged about twenty-three years, had an exposure of the pulp of the left inferior first molar, which was disclosed upon the removal of a large and defective amalgam filling, pain being present. The pulp was devitalized and the canals medicated and

filled. The patient returned complaining of discomfort. The left superior first molar had been extracted. As the left superior and inferior molars were sensitive to percussion, their inter-occlusion was eased and the trouble ceased. It seemed at the time that part of the discomfort was caused by lateral pressure of the left inferior second molar upon the inferior first molar, thus keeping up an irritability of the pericementum of the latter tooth.

Mr. F. V., aged twenty-four years, had for many months suffered discomfort in mastication with the left superior second molar; an itching sensation in the tooth was also complained of. The patient acknowledged a great sense of relief when the force and direction of the impact had been modified, and has had no return of the symptoms in more than a year.

The foregoing cases have been significantly associated with the loss of one or more teeth through extraction. The case of Mr. L. C., aged thirty-five years, is associated with a comparatively normal denture. After the large bucco-morsal cavity of the left inferior second molar had successfully filled, tenderness was noticed in the first molars of the same side. The discomfort seemed to be due to the prominence of the cusps of these teeth, and comfort was restored by the use of test-paper and the corundum-stone.

Reference having been made to the "cup and saucer" form of inter-occlusion of the third molars, the writer has ventured to refer the same to a pivoting action of the masticatory apparatus, sometimes more pronounced on one side than on both. A Scotch gentleman, about thirty years of age, called in 1881. The only defects to be remedied were two small cavities on the buccal and morsal aspects of the left inferior third molar. Gold fillings were inserted, which, in time, were dislodged; and both amalgam and cement fillings were resorted to, from time to time, without success, until now we have the deep, smooth saucer-shaped surface in the lower tooth with its converse in the upper tooth. (The concavity will sometimes be found to exist in the superior tooth, and the convexity in the lower one.) That there is and perhaps always has been disproportionate muscular action, in this case, on one side, is somewhat supported by the fact that, in 1888, the lingual portion of the crown (non-carious) of the left inferior second molar was fractured off by biting upon a small piece of bone in the food. The pulp, being exposed by the accident, was devitalized by arsenic, the canals were filled with a medicated paste, and the crown restored with amalgam. In July, 1893,—five years later,—this tooth was found to be again fractured longitudinally through its buccal half, and was extracted as being beyond further aid.

The main benefit that the writer has derived from the observation of these and other cases has been the conviction that the extraction of one or more teeth, especially of the inferior first molars, is liable, sooner or later, to lead to discomfort in some of the remaining teeth, and that such discomfort may, with patience, be located and relieved by the use of an engine-stone.

The chairman announced that there would be a clinic in dental implantation to-morrow morning (Saturday), at 9 A.M., by Dr. Younger, of San Francisco, Cal., at 102 Michigan Avenue.

There being no discussion of the papers, the meeting adjourned.

SECTION III.—CHEMISTRY AND METALLURGY.

This Section held no meeting.

SECTION IV.—THERAPEUTICS AND MATERIA MEDICA.

Dr. N. S. Hoff, Ann Arbor, vice-chairman, in the chair.

The first order was the paper by Dr. Poincot, of Paris, France, which was read yesterday, and time was given for a discussion of the subject.

DR. CRAVENS thought that the paper had suffered in translation; that there were evidently ideas advanced which were not fully understood. As I understand the essayist's idea in trepanning, he means we must trepan or bore into the pulp, and remove the calcification.

The next paper read was one by Carrie M. Stewart, D.D.S., of Ann Arbor, Mich., on "Experiments with Bichlorid of Mercury." The chairman read the paper, as follows:

EXPERIMENTS WITH BICHLORID OF MERCURY.

Because of the peculiar action of bichlorid of mercury upon material of an albuminous nature, its efficacy as a germicide is believed by some scientists to be less than the standard usually assigned to it. When brought in contact with the substance to be acted upon, the albumen present is superficially coagulated, the interior of the mass escaping many times, because of a lack of penetrating power in the disinfectant. Such being the case, it has been urged that in the action of bichlorid of mercury upon the germs of disease, the same effect is produced,—*i.e.*, the external gelatinous capsule of the germ is coagulated, while the internal, vital portion is left untouched, and if by any means the compound between this covering and the disinfectant be dissolved, the micro-organism is quite as ready to manifest its characteristic phenomena as though it had never been subjected to the action of the disinfectant. Acting upon this hypothesis, investigators have endeavored by experi-

mental research to conclusively confirm or disprove the theory, but as yet their efforts have not met with success. A method which seems very satisfactory so far as showing the effect of certain chemical substances upon the supposed compound formed between the bichlorid of mercury and the envelope of the germ, is that used by Dr. McClintock, author of a paper entitled "Corrosive Sublimate as a Germicide." This method has been used in the experiments given here, and briefly outlined is as follows:

An ordinary test-tube is plugged with cotton wool, and through this plug is passed a glass rod containing a plug of the same material for part of its length. In the test-tube is a small amount of non-germicidal alkali, as calcium carbonate or carbonate of sodium and sodium chlorid. After sterilization the apparatus is ready for use. To a definite quantity of the bouillon culture of the germ was added a definite amount of the HgCl_2 , strength 1 to 1000. After a given length of time one c.c. of the disinfected culture was transferred to the prepared test-tube and connected with a hydrogen sulfid generator until sufficient precipitation of the mercury had taken place. Gelatin or agar media was then inoculated with from three to four loops of the preparation, and Petri plates made. The chemical action taking place is very manifest, the hydrochloric acid formed being neutralized by the alkali present, sodium carbonate or calcium carbonate. The sodium chlorid solution assists in dissolving the compound formed between the bichlorid of mercury and the gelatinous material, or the protecting envelope of the micro-organism.

The germs used in experimenting were the *Staphylococcus pyogenes aureus* and *albus*, because of their frequent occurrence, and, although not spore-forming in the common acceptance of the term, they are nevertheless very resistant to destructive influences. This work was done to satisfy myself of the efficacy of bichlorid of mercury as a germicide under certain conditions, and although the experiments made were comparatively few in number they were accomplished with all possible care and accuracy.

1893. April 7, five c.c. of 1:1000 bichlorid of mercury to five c.c. of bouillon culture of *Staphylococcus pyogenes aureus*, three days old. Time of exposure, fifteen, thirty, sixty minutes. Agar plates. April 11, the fifteen and thirty-minute plates well developed. April 27, sixty-minute plate still undeveloped. April 28, one c.c. of HgCl_2 to five c.c. of culture of the *Staphylococcus pyogenes albus*, fifteen days old. Time, twenty-four hours. Three agar plates made. May 8, all three plates developed. April 28, five c.c. of HgCl_2 to five c.c. of culture of *albus*, fifteen days old. Time, twenty-four

hours. Three agar plates made. May 8, no development on any plate. May 3, fifteen c.c. of HgCl_2 to five c.c. of culture of the albus, five days old. Time, twenty-four hours. Three gelatin plates made. May 11, one colony on each of two plates, the other one being undeveloped. May 3, ten c.c. of HgCl_2 to five c.c. of a bouillon culture of the aureus, four days old. Time, twenty-four hours. Three gelatin plates made. May 11, no development. May 9, twenty c.c. of HgCl_2 to five c.c. of culture of the albus, seven days old. Time, seventy, eighty-five, one hundred, and one hundred and twenty minutes. Two plates for each exposure. May 18, no colonies on the plates of the first two exposures. One of the plates having the one hundred minutes' exposure exhibited one colony, while the other had none.

Of the plates having the two hours' exposure, one plate was undeveloped, while the other possessed three colonies.

May 11, five c.c. of HgCl_2 to five c.c. of the aureus culture, two days old. Time, fifteen, thirty, forty-five and sixty minutes. Agar plates. May 22, one colony on the plate having the forty-five minutes' exposure, none on the others. May 15, two c.c. of HgCl_2 to five c.c. of a culture of the albus, seven days old. Time, fifteen, forty-five, and sixty minutes. Gelatin plates. May 22, plate of the fifty-five minutes' exposure very well developed. Others not.

All these experiments were performed with sodium carbonate used as a neutralizing agent, care being taken that a sufficient quantity was used to serve the purpose. In the succeeding experiments, barium carbonate was used instead.

May 16, five c.c. of HgCl_2 to five c.c. of bouillon culture of aureus, six days old. Time, fifteen, thirty, forty-five, and sixty minutes. Gelatin plates. May 26, no development in any plate. May 17, two c.c. of HgCl_2 to five c.c. of a culture of the albus, seven days old. Time, twenty-four hours. Gelatin plate. May 24, one colony. May 23, five c.c. of acid solution of HgCl_2 , 1:1000, to five c.c. of culture of the aureus, two days old. Time, five, ten, fifteen, thirty, and sixty minutes. Gelatin plates. June 6, no development in any plate. May 31, one c.c. of acid solution of HgCl_2 to five c.c. of albus, six days old. Time, one, five, ten, fifteen, and sixty minutes. Gelatin plates. June 9, no development. June 1, three c.c. of acid solution HgCl_2 to five c.c. of culture of albus, nine days old. Time, one, five, fifteen and thirty minutes. Gelatin plates. June 9, no development.

A little experimenting was done with a solution of HgCl_2 , 1:500, to test its germicidal powers.

When precipitation of the mercury by hydrogen sulfid

occurred, the solution was found to be valueless as a germicide; while without the action of the hydrogen sulfid its effect upon the germs was immediate.

May 19, one c.c. of HgCl_2 , 1:500 to five c.c. of albus culture, four days old. Time, one, five, ten, and fifteen minutes. (H_2S employed.) May 22, all profusely developed excepting the plate of the ten minutes' exposure, which had no colonies. May 19, one c.c. HgCl_2 to five c.c. of aureus culture, three days old. Gelatin plates. Time, one, five, ten, and fifteen minutes, without precipitation by H_2S . May 31, no development in any plate. May 23, five c.c. of HgCl_2 to five c.c. of culture of the albus, four days old. (Precipitation of mercury by H_2S .) Time, thirty minutes. Gelatin. May 31, very well developed.

In looking over the results presented here, one will notice now and again a seeming irregularity in the development of a plate, for instance, a plate of fifteen minutes' exposure, may exhibit no colonies, while one of sixty minutes, of the same series, may be well developed. This may be explained by the supposition that only the more feebly resistant germs were transferred to the gelatin, in the first case, and being destroyed by the germicide before the transference no development could consequently take place.

In the latter case a sufficient number of the more resistant germs were brought over to show development under suitable conditions.

Again, enough of the germicide may have been taken over with the germs to have formed a sterilized area around the micro-organisms, preventing their growth in the one case, while in the other the disinfectant was sufficiently disturbed throughout the gelatin to prevent anything of the kind. Care was taken to accomplish this in every case, however.

The neutralization of the acid formed was also especially looked after.

In comparing the results obtained from the use of the ordinary solution of bichlorid of mercury and that of the acid solution, it will be noticed that the latter is far more prompt and efficient in its action than the former, due probably to the excess of hydrochloric acid in the acidulated solution.

Although it is manifestly evident that bichlorid of mercury is not sufficiently penetrating in its action to serve as a germicide, excepting under conditions most favorable to its complete performance of the results desired, yet the ideal germicide has not been discovered, and those that are so efficient as bichlorid of mercury are hard to find. It would seem from the experiments of others, that the more concentrated solutions of this disinfectant are still less to be relied upon in their action than the strengths more ordi-

narily used, from the fact that the combination between the bichlorid of mercury and the capsule of the germ is more quickly effected, and, although the portion influenced is probably of a firmer consistency than that brought about by using a solution of weaker strength, still the amount of penetration is not so great and the desired results not so nearly accomplished. Because of its extremely poisonous nature, bichlorid of mercury will never be extensively used alone in dentistry, yet, with a proper knowledge of its powers and those of other germicidal agents of a high degree of usefulness, a combination may be effected in the future, which may prove of the utmost value to the oral surgeon.

The paper was on motion passed without discussion.

Then followed the reading of a paper by Dr. E. Lecaudey, of Paris, France, upon "Treatment of Abscess of the Maxillary Sinus," which was read and presented by Professor Barrie, of Paris, as follows:

TREATMENT OF ABSCESS OF THE MAXILLARY SINUS.

For more than thirty years I have cured among my clients over sixty cases of abscess of the maxillary sinus.

At first I employed a tin tube, of one and a half millimeters in diameter, cut at each extremity, and with bent points, which I would fix in the inferior opening of the sinus. Experience taught me the length of time required in such a treatment, and the difficulty with which a fistula would close up. Having been a long time studying the subject, I once read a thesis by Dr. Veillard, treating of anal fistula, in which was described treatment with zinc chlorid. The idea then struck me to apply the treatment to fistula of the sinus, and I obtained most excellent results.

The cases that I have oftenest treated were caused by the second bicuspid; less frequently, by the cuspid and first molar. The treatment has generally lasted from eight to twenty-one days, and has never lasted more than six weeks. My observation has taught me that the more one dispenses with the small tube, the quicker the fistula will close up. After having performed the extraction, I wash carefully with hydrogen peroxid, the cavity of the sinus. Then I inject the following :

Chlorid of zinc.....	1 gram;
Phenic acid.....	.5 "
Distilled water.....	100 "

In order to keep the fistula open, I place a little silk string, saturated with wax; and if, as rarely occurs, it will not close up, I take a small pencil of gutta-percha, which I saturate with a little chlorid

of zinc, place it for twenty-four hours inside of the fistula, and the edges close up by deep cicatrization very rapidly.

I have never had, owing this method of treatment, any repetition of the disease.

Professor Barrie next read another paper on "Boracine," by Mr. Denis, of Paris, France, as follows:

BORACINE (TETRABORATE OF SODA).

In one of the last numbers of *L'Odontologie* there appeared a most interesting article, treating of the antiseptic properties of boroborax.

For some time past I have used an identical process, and a similar substance called boracine. It is a salt, perfectly purified, resulting from the combination of equal parts of borax and boric acid. This tetraborate of soda is neither caustic, toxic, nor irritating, properties that often belong to antiseptics. Moreover, it has the advantage of being tasteless and odorless, and of dissolving in the proportion of sixteen per cent. I have tested the value of these products, and these are the observations which I have made. First, I have employed it for the disinfection of the dentinal tubuli, and I must say that the results were very satisfactory. However, the results I have obtained have not permitted me to substitute it for the different antiseptics already known. I have also applied it in the treatment of the mucous membrane, in which case it has given me astonishing results.

Among the number of cases, which are too long to enumerate, there are two which are particularly interesting. The first one was upon a rheumatic subject, in the treatment of an abscess of the maxillary sinus, produced in consequence of the too prolonged retention of a first large molar, which was diseased, having caused many consecutive accidents in connection with caries of the fourth degree. I extracted this tooth; and without entering into details, as is usually the case with an ordinary treatment of such an affection, I treated the abscess, excluding all other antiseptics, and employed only boracine. The second day the suppuration had already begun to diminish, and stopped entirely at the fifth day. That happened three months ago, and my patient has not suffered since. His gums, without being completely healed up, have, however, some time since, regained the normal color. This rapid result has been obtained by putting one coffeespoonful of pulverized boracine in the wound of the sinus, that I took special pains to rinse before performing the operation, with boracine water of sixteen per cent.; the adding of the powder to the solution has the object of facilita-

ring the absorption of the remedy by the mucus, and in a most direct way; consequently the most efficacious one. The first day I performed three dressings; the second, the third, and the fourth days, two dressings; the fifth day only one. Every trace of infection has disappeared, and I have often seen my client since that time, enough to convince me entirely that he was thoroughly cured.

The second case is that of a party who, in consequence of a bad extraction of the left cuspid and of the superior incisor, had the anterior part of the maxilla broken in different places; his different teeth were all affected with caries of the fourth degree, which caused many chronic abscesses in the alveolus border and fistulæ in the gums. A month after the extraction of these teeth, the patient felt some deep and continuous aching, and the abscess, instead of diminishing, was increasing every day.

It was at that time that he came to consult me to relieve him of his pain. Having detected the presence of sequestra, I cauterized an opening of about one centimeter in width, at the position of the right incisor. In the middle of the principal mass, I was lucky enough to extract several deposits of some millimeters, and one measuring exactly a centimeter and a half by one centimeter. As soon as I finished this operation, I rinsed it a number of times with boracine water of sixteen per cent.; then I saturated the wound, so to speak, with some pulverized boracine, and placed a strip of saturated gauze at the orifice, in order to prevent the closing of the cavity too quickly; a consequence which would not have permitted the ulterior evacuation of the pus, and which also might have prevented my seeing if anything had escaped my investigation. The next day I observed that the abscess had disappeared, and that there remained hardly any trace of suppuration. I performed the same dressing as the day before, without leaving the saturated string. The next day, everything was over. Eight days after, the gum had regained, if not entirely its primitive shape, at least its normal color, and no complication has ensued since. This demonstrated, in the first case, collection of considerable pus, which was stopped the fifth day after beginning the treatment; in the other case, it was stopped the day after.

I think, therefore, it would be a good thing to generalize the employment, particularly for the buccal mucous membrane, which interests us the most. In order to sustain such results, I could not do better than quote the names of Doctors Galezowski, Landolt, Hubert, La Grange, etc., all of whom now employ boracine in all their clinics with great satisfaction. As a daily antiseptic, its use is plainly indicated against putrefaction of food-particles which

remain in the interstices of the teeth, and create an unfavorable element for the multiplication and the station of various microbes, which lodge in the buccal cavity, waiting a favorable opportunity to invade the different organs and produce some injuries. Altogether, I have tried to draw your attention to the employment and the virtues of this new antiseptic, that we salute as having made its entrance into the medical domain.

Believing in the results that it is undoubtedly called to render to our art, owing to its important qualities, it only remains to speak of the properties of this double salt as applied to the enamel of the tooth, and this will be the subject of a new study.

There being such a small attendance at this Section, on motion the discussion of the papers was passed, and the Section then adjourned *sine die*.

SECTION V.—DENTAL AND ORAL SURGERY.

DR. BROPHY. We are honored this afternoon for the first time with one of the officials of the Congress, and I desire to introduce to the members present Dr. A. W. Harlan, secretary-general. (Applause.)

DR. A. W. HARLAN. Mr. Chairman and Gentlemen: It has been impossible, on account of the numerous duties I have had to perform, to visit personally the various Sections, but to-day it has come my way to visit this Section, and from the reports that have been published from day to day we learn that some of the most valuable papers of the whole Congress have been presented here. And the object of my visit at this time is in the interests of surgery. Dr. Harlan then announced that Dr. Younger would give a clinic upon implanting one or more teeth at the clinic rooms.

DR. BROPHY. One of the topics which has been sent to this Section to be discussed, and which I will now bring before the meeting, is "What neoplasms, both as to kind and degree, necessitate the excision of the inferior maxilla in whole or part when associated with that bone?"

DISCUSSION.

DR. CRYER, Philadelphia, Pa. I have to talk more from the standpoint of a surgeon than a pathologist. I will classify diseases of the jaw into two kinds. Those of the inferior maxilla are either explainable or unexplainable. We know if we have the ordinary fistula situated below any of the teeth, we have to call it a dental alveolar fistula. If we have a tooth that is devitalized and an abscess below it, that is what I would class as an explainable disease. Then we can have growths coming up between the teeth which on

the first appearance would appear to be non-explainable, but by passing along the side and we find this to be a fungoid growth that comes out of the tooth it is certainly explainable. Another fungoid growth comes between the teeth where the teeth are healthy and are normal, and you can rest assured that this is not explainable. Of course the unexplainable disease cannot always be cured, but if you know the cause it can be treated and cured. If you have one of those growths that is not explainable, do one of two things—cut it out or let it alone. Don't use caustics. If you do it will break down the tissue and make it worse than before. Now, how far shall we remove the bone that is the seat of neoplasm? In any case remove the neoplasm. If it includes a small portion of the bone, remove it; if a large portion, remove a large portion; if it includes the whole jaw, remove it. I have a specimen which by accident I have with me. It was pronounced a neoplasm. It was immediately behind a bicuspid. It puffed up and filled a greater portion of the mouth on one side until the patient could not close the mouth. The operation of a great majority of surgeons would have been, and it was recommended, in this case to remove half of a jaw. Fortunately he fell into the hands of a man who came from the dental profession originally. He said no, remove that tumor and nothing more. Take off the main portion so you can see what you are doing, and then get down as far as it exists. Just think of disarticulating the maxilla for a cause like that! The surgeon in this case cut away the large mass in the mouth and opened the lip at the median line and exposed the bone; he had his instruments ready to remove all if necessary, but he said we will go down first and cut out what we can with a circular saw, and then we will take the burs and smooth the part up, leave all the good tissue that is there and remove the bad. That section which I show you was removed, and we found we had not got all the diseased part out; burs were then used, and all the diseased bone, and a little more, was taken away, leaving a narrow rim of healthy bone with its over-hanging edges of periosteum. When the bone is healthy, by all means leave it there, as was done in this case. This operation was performed eight years ago, and the patient has been acting on the stage all over the United States since that time.

Therefore I wish to say again, cut away a neoplasm and I might say a little beyond it, but no farther. Don't take out half a man's jaw if you can save even only a little rim of it. All who have seen this kind of operation, know that the bone to a very large extent will be reproduced, and then an artificial appliance can be placed in the mouth and the man will be almost in a normal condition.

DR. YOUNGER. I have had to treat a number of cases, and found by the use of lactic acid I could remove the diseased bone without the use of the knife. I had a case where all the surgeons were against me. They were going to remove the jaw for a cancerous structure. The doctors said the only way was to remove the bone. When the lady came to me I found the pus discharging from several different places, and I had been experimenting with lactic acid in similar cases, and so I suggested its use. I used lactic acid with about equal parts of warm water, as I find that is more effective than cold water. Afterwards I used a stronger solution. The operation was successful.

DR. BROPHY. Upon the closing of our Section and the closing of the work which has been put before us to do, I feel that we have occasion to congratulate ourselves. A month or two ago it looked as though this Section would not be able to accomplish much. This afternoon I feel that when the records are prepared and published, the work of this Section will compare quite favorably with that performed in any other Section of the Congress. I feel that the work done here will reflect credit upon those who brought about this great meeting, and that our transactions when put in book form will fill an important place in the history of dentistry.

On motion of the secretary, the Section adjourned *sine die*.

SECTION VI.—OPERATIVE DENTISTRY.

Meeting was called to order by the chairman, Dr. Jarvie.

A paper was read by Dr. Geo. W. Whitefield, of Evanston, Ill., entitled "Conservative Methods of Treating Fractures of the Anterior Teeth."

Dr. Whitefield illustrated his paper by several drawings.

CONSERVATIVE METHOD OF TREATING FRACTURES OF THE ANTERIOR TEETH.

As long as children play and stone sidewalks are hard, so long will teeth occasionally be broken off. Sometimes a whole tooth is knocked out or broken off at the gum line, but more often simply a corner is chipped. Again, the whole incising edge is snapped off far enough down to involve the pulp. What should be done in such cases? These accidents most often occur in childhood, so that we, as conscientious practitioners, must consider what is best, not only to remedy the present disfigurement, but also to secure the best results for a lifetime.

If the pulp is destroyed, the remnant of the tooth cut off and a crown put on, even if the crown is made in the most artistic manner—in fact, an ideal crown—by cutting off the tooth, are we doing

the best for our patients? Emphatically, no, not if the tooth can be saved for a few years; the crown should be the last resort.

Let me call your attention to one or two cases in my practice:

During the skating season a lad fell on the ice, breaking a large portion of the central incisor, leaving the pulp exposed. He came almost directly to my office; it was in the early evening. I will describe in detail my treatment to save the exposed pulp, as I knew that the death of the pulp at that time would mean imperfectly formed root and consequently early loss of the tooth. With bibulous paper I removed the blood from the exposed portion of the pulp, bathing it with a mild antiseptic, and after thoroughly drying the fractured end of the tooth, including the exposed portion of the pulp, I flowed collodion over the pulp, allowing it to extend to a short distance beyond the exposure. After this was dry I repeated the operation two or three times, then before the last coat was quite dry I covered the spot with a small piece of No. 4 gold foil. I repeated this operation with the collodion and gold foil several times; then being careful to remove all collodion from the margins, I flowed Justi's cement mixed to a cream over the end of the tooth, partially restoring its contour. Little more than two months later, finding the pulp alive and not very sensitive, I fitted an open-faced gold crown to the tooth. The pulp remained alive about eighteen months longer. My intention was to do in this case what I shall have the pleasure of showing and describing to you in the case I have with me.

Mr. B. had a left central incisor broken by being hit by a carelessly-thrown stone. When the case came to me, the pulp was alive and the tooth somewhat sensitive at the exposed dentine. I restored with gold the palatal and mesial angle, allowing the gold to just appear above the mesio-labial angle, then holding a piece of ice against a carborundum to keep it from heating, I ground off the tooth to a level with the gold. This left the tooth about one-eighth of an inch shorter than its companion. I then fitted a gold cap extending to the gingival margin, soldering a hook on the labial surface close up to the gum line.

At another operation I adjusted bands around the lateral and remaining central near the excising edge, each having a loop of hollow wire soldered on the labial surface. Taking a piece of fine piano-wire (Donaldson broach would do), I filed it down so that it would bend as a bow. Resting it in the loops in the bands on either side of the broken tooth, I sprung the piece of steel into the hook on the gold crown,—a very weak spring was all that was needed to bring the tooth to the line with its mate. The uneven-

ness of the gum line is not noticed. The moving of the tooth was accomplished in less than a week, with no disturbance to the pulp. This method is applicable to partially erupted teeth, only in such cases it will be harder to adjust the crown.

DISCUSSION.

DR. E. J. PERRY, Chicago. I would like to ask if the pulp had been dead when the little patient you mentioned in your paper came to you, would you have put the crown on, or built it up with gold, or what?

DR. WHITEFIELD. That would depend on how extensive the fracture is. If it could be done as I have described, I should prefer it. It looks better in every way, because putting a crown on in early childhood is not very satisfactory. We know that there will be some recession, and the band will show. Often you find that the pulp has been devitalized, and a crown put on, when the pulp might have been retained for some time. The longer the pulp is retained, the denser the tooth will be, and the longer it will last.

DR. A. C. HEWITT, Chicago: I think this case is deserving of all praise. It is ingenious, and it certainly shows a knowledge of the condition of the parts anatomically. Some objection may be raised to the gum line being separated from the margin of the enamel. That can be remedied, as we all know, by the implantation of a disk. It is easily done, and is within the reach of all good dentists. Simply get a piece of gum from a porcelain tooth, cut out a disk, and implant it right under the gum. It will stay there for a great many years. I am very glad indeed to have received the hint from the doctor. I have a case now, where the front teeth do not come together at all. I think I will pull those teeth down, and I am obliged to the doctor for the suggestion. I want to say that in a case where the teeth are knocked out, they should be replanted. I can be a living witness to the value of implantation. When I was a little lad about eight or nine years old, I ran my front teeth against the forehead of a school-fellow, cut a deep gash in his forehead, and knocked one of my incisors out on the sand in the playground. I picked it up with a great deal of regret, even at that early age. I said to myself, "If broken bones will heal up, why will not this tooth grow there?" I brushed off the sand, put the tooth in its place as best I could, and held it there. As I had not strength enough to force it in place, I put my teeth together, and bit down hard on it. Then I went home to my mother, who bound it up for me, and kept that on for two or three days. I wore that front tooth until I was nearly forty years of age. Had that tooth been treated properly, that is to say, had the root-canal been filled and treated antiseptically, I would

have worn it to-day, instead of having to wear a bridge. I thank the gentleman who read the paper for the aid it has given me.

Dr. JARVIE. At the meeting on Wednesday, there was a paper read on oxyphosphates, and it was plain that to retard the setting of the oxyphosphate it was wise to use a bottle filled with ice-water. That was questioned by others in the room, among them by Dr. Knapp, of New Orleans, and he is prepared now to demonstrate the fact that it is impossible to properly mix the oxyphosphate on the outside of a bottle filled with ice-water.

Dr. KNAPP. I would state that in the printed directions which come with some of the cements, we find this instruction given us: "Changes in temperature of the cement or mixing-slab produce various changes in the setting of all cements." "It will be found that mixing the cement on a flat flask or square bottle filled with cold water, will retard its setting, when this is desired."

I simply stated here the other evening that this statement was not correct, for I had tried the experiment. Two gentlemen called in question my statements in regard to the matter. I have here a bottle filled with ice, and any gentleman can take that and wipe it off with his handkerchief, and he will find that in a moment the moisture will appear again and preclude the possibility of mixing any cement there. Another gentleman said we could take a glass slab, not a bottle, and place it in ice-water, thereby chilling it, and so retard the setting of the cement. I replied to that gentleman that the glass slab would do just the same as the bottle would. The point I wish to make is, that no solution has yet been given by any of the members. It would be highly edifying to all of us to know how the crystallization of cement can be produced more slowly for setting bridge-pieces, particularly where there three or four caps to be filled with the cement. These slabs and the bottle filled with ice are here, open to the inspection of any one who wishes to see them.

Dr. D. M. Cattell, of Chicago, Ill., read the following paper:

OPERATIVE TECHNICS.

The name "Operative Technics" is understood as the title of a department recently added to the curriculum of a few dental schools.

Since students generally began matriculating in dental schools, it has been noticed that students in the clinical department were not so well trained in the use of instruments at the beginning of their career at the chair as was desired; nor were those so apt who came first to college, as those who had taken advantage of preliminary work under preceptor.

So marked was this lack of manual dexterity, that when Dr. G. V. Black took charge of the infirmary of the Chicago College of Dental Surgery, he immediately set about devising means for overcoming this deficiency, resulting in a paper before the Odontological Society of Chicago, June 21, 1888, entitled, "Outlines of a Course of Study in Operative Dental Technics," and at the opening of next school term in the institution with which Dr. Black was connected, the World's Pioneer Class in Operative Technics was organized.

Considering the newness of the course established, the inexperience of the instructor in that kind of work, the lack of practical experience as a guide to better effort, with no text-book applicable to any one of the many lessons gone over, the result was in the highest degree satisfactory.

The second year's work, with the experience acquired, was much easier, although many low places in the path had to be built up.

The third year was one of decided progress, owing to the fact that Prof. G. V. Black had issued his "Anatomy of the Human Teeth," which was just such a work as we had needed.

Five years have passed since the inauguration of the first class in dental operative technics. In that time much improvement has been made in methods of teaching and systematizing the work.

In its beginning, the course occupied three months' time; it is now lengthened to six months.

The technic department has for its aim four cardinal points :

1st. Manual training, or handicraft.

2d. System.—Each step following the other in methodical order.

3d. A greater familiarity with teeth.—Outward forms, inner channels, structure and plan of development.

4th. Individual reasoning.—Teaching students how to think for themselves.

The work of the department is divided into studies or lessons. Each division has its own heading, and notes of all work done under that heading must have its particular allotment of space in the note-book of each student. One student may be extended over a period of from three days to as many weeks, owing to the breadth and importance of the subject; or certain lessons may be continued and taken up again as opportunity presents. The present course as given in the Northwestern University Dental School is divided as follows :

1st. A study of technical terms, a hundred or more words with which the student will come in contact all through the lecture

courses and text-book reading. These words, when thoroughly understood, become the key by which students can often unlock and open to themselves the meaning of many otherwise obscure sentences. Examples.—Abscess, ulcer, pulpitis, pericementitis, disinfectant, antiseptic, incise or incisor (scissors), septic, aseptic, caries, necrosis, mortification, gangrene, stimulant, anodyne, anesthetic, deciduous, mesial, distal, buccal, occlusal, etc.

2d. A study of typical tooth-forms, including their several surfaces and surface markings; noting certain "Landmarks" peculiar to each denomination of teeth, also malformations. In this lesson each student has the work of Prof. Black, on the teeth, as a text-book. He is also supplied with a "ring of teeth"—a set of typical teeth properly arranged and strung on wire bent in the form of a ring for convenience in handling. When the study of a certain tooth is taken up, the student has this tooth before him on the ring. There are also charts hung up in the class-room. These charts represent the same pictures enlarged as seen in the text-book, showing the several surfaces of each respective tooth. If possible, the student should have several teeth before him of the same denomination under discussion, that he may become familiar with the common variety of forms. After going carefully over the several surfaces and noting their lobes, developmental lines, sulci, and other surface-markings, each student is then invited to select a tooth similar to the one undergoing inspection, from a miscellaneous lot of extracted teeth.

3d. A study of pulp-chambers and canals. The student, having been supplied with a box containing some twenty or more wooden blocks one and one-fourth inches long by three-fourths inch thick, now fastens the tooth he has just selected, lengthwise on the block with sealing-wax. The tooth and block can now be set in a small bench-vice. Two or more teeth of the same denomination are to be selected, and so arranged upon the blocks that different faces of the tooth will be presented to view. With selected files the student cuts away the tooth fastened on the block, so as to expose the pulp-chamber and canal throughout its entire length; the cutting continuing until the central portion of the chamber is reached, he then removes the block and tooth from the vice. Now using the block as a handle, he "inks" the exposed cut surface of the tooth and presses it down upon a slip of selected paper, and the result is the so-called "silhouette pictures," showing the pulp-chambers and canals. Of each tooth so dissected the student makes a line containing not less than five pictures. And of each denomination of teeth there should be several aspects of the chamber

opened. When all the cuttings are made, the blocks to which they are attached are arranged in proper order in the original box and kept by the student as a memorial of his early professional studies. The silhouette pictures of each denomination are printed on separate pages of a specially-ruled blank book, and constitute when done a text-book, if you please, on the subject, that the student may keep for ready reference.

4th. The physical, anatomical, chemical, and microscopical divisions of tooth-structure. These studies are prepared by the means of lectures and charts, and when possible, having students make both longitudinal and cross sections, studying them through the microscope. This work for the freshmen should be rudimentary, as a more careful study of both hard and soft tissues will be had in the regular histological course. A special study of enamel in reference to cavity margins is made. The idea is to impress upon the student's mind the need of greater care in preparing enamel-margins of cavities preparatory to filling.

5th. Free-hand drawing and modeling. The drawing of the different surfaces of the teeth by students helps to train the hand, as well as to call closer attention to form and certain surface markings. While the time is not sufficient for a thorough course in drawing, yet much may be done in the way of starting the students toward a better method of explaining or demonstrating a point in future before dental societies. Modeling teeth in clay or its equivalent is excellent training for both hand and eye, and should be indulged in as much as time will permit. The models should average at least six inches in length.

6th. A study of the more common medicaments such as are found generally in dental offices. This is not intended to supplant the systematic work of the chair of materia medica and therapeutics, but is preliminary to it; not going into detail other than to give the origin of the drug and the name of the dentist who proposed the remedy, if known, and his method of using it; also from whence the medicine is derived. Many of these remedies are compounds or mixtures. These remedies should be classified as disinfectants, antiseptics, anodynes or obtunders, stimulants, counter-irritants, etc. Each student should have in his case some eight or ten bottles, and these should be supplied with certain medicines for his experiments while in the class. These drugs are to be handled, looked at, smelled, tasted, indeed gotten thoroughly acquainted with.

7th. Students select from a miscellaneous lot of teeth placed before them, a set, many of which should contain cavities ranging from simple exposure of dentine to large cavities involving pulp-cham-

bers. These teeth should be properly arranged as to original position, and their roots imbedded in gutta-percha. This set of teeth, so arranged, is to be considered a *Dummy Patient* for the student to practice upon. A wooden block carved to the shape of a human head, with a movable lower jaw, and instead of ridges to represent the alveolar processes there should be wide and deep grooves into which the gutta-percha that is to surround the roots of the teeth is placed. (Magnusson's Dummy Head is excellent.)

8th. Pulp-capping and devitalization. With the "dummy" before him representing a supposed patient, the student seeks for slight pulp-exposures; having listened to a lecture on the subject regarding the diagnosis, prognosis, treatment, and final capping or devitalization. As each pathological case is presented, the student applies the remedies supplied in his case-bottles as directed by the instructor; after due treatment the supposed exposed pulp is capped or devitalized according to the specific directions of the instructor in charge.

9th. Supposed cases of dying pulps, putrescing pulps, and entirely decomposed pulps. From the medicines furnished him, each student applies treatments to the different conditions suggested, until he becomes familiar with the class of remedies required in each pathological condition.

10th. A study of the pathology and therapeutics of alveolar abscesses—blind or sleeping, acute, chronic, fistulous. Also of ulcers, pulpitis, pericementitis, etc. This is done by lectures and charts; students making applications to supposed lesions from their medications.

11th. Cleansing, drying, and filling root-canals is practiced until students become quite familiar with the different methods of procedure; giving preference always to the one considered the best.

12th. Bleaching teeth. This study is made by the way of lectures and experiments in test-tubes or breakers upon vegetable matter, so that the results are soon observed by the students. Also practical application to discolored teeth found in the miscellaneous lot.

13th. Instruments. Each student supplies himself with a set of instruments and certain appliances according to a list furnished him. No other patterns are allowed. These instruments are a part of the set required of junior and senior students on entering the infirmary the following year. These instruments are classified and named. This classification and naming are according to certain rules recently proposed for the use of the school by Prof. G. V. Black. Students are furnished brass wire of a certain size, from which they are to make models of those called for by the list.

14th. Preparing cavities. Students are instructed regarding the opening up of cavities, and the proper shape they should assume. The simpler forms only are studied here,—beveling of enamel-margins; what instruments should be used and how to grasp them. (No engine is allowed in this course.) *Hand training* is one of the cardinal points. Ivory, bone, or certain compounds are often substituted for teeth, in which to form cavities—typical shapes.

15th. Filling-materials. Students practice filling these cavities with the different classes of filling-materials,—gutta-percha and the different preparations of the same, cements—both phosphates and chlorids, amalgams—alloys, and copper, tin, aluminum, gold, both non-cohesive and cohesive, and combinations of two or more. These filling-materials are *studied*. Many of the cements and amalgams are made before the class.

16th. Miscellaneous matters. Any matter that may seem important that the freshman class should be posted in. These matters can be sandwiched in any time along through the course that the instructor deems best.

This course of technics may be somewhat modified each year, always with a view of bettering it. One essential condition of the course is, that nothing must be taught here that is not in accordance with the teachings of other special chairs; nothing taught that must be untaught by succeeding instructors; hence the Technic teacher should be familiar with the methods advocated by the other professors of the institution with which he is connected.

Now, if by means of this course of instruction students can be benefitted manually and mentally in a manner which is unattained by other known methods or systems of teaching, this effort will not have been in vain.

If the student has gained in handicraft, systematized his daily course of procedure, become more intimately acquainted with the organs on which his future labors will be bestowed, has learned the art of thinking for himself, and become logical in his reasoning, he is then ready to pass into the clinical department, and there add practical knowledge to the hints he has thus far received.

DISCUSSION.

DR. CARLTON, California. I listened with a great deal of pleasure to Doctor Cattell's paper, and especially am I pleased to add that a course is being pursued, similar to the one outlined by him, in the College of Dentistry of the University of California. The course Dr. Cattell outlined is only for freshmen, and is intended to supply the lack of preliminary practice. It is intended to thor-

oughly familiarize the students with working on the tissues that they will have later, in the infirmary ; it also familiarizes students with ideal tooth-forms and pulp-chambers and their treatment. We use somewhat a different dummy: it is a little model, of brass, very similar to a model of the lower jaw, such as you would make in plaster, having a groove running from heel to heel, which is filled with modelling compound ; the student is requested to find a full set of teeth, for the lower and upper jaws, containing cavities of all descriptions, some with the pulps exposed. This model is screwed to the bench, in front of each student in the laboratory, and upon that model the work is performed. All classes of cavities are filled, and all classes of fillings are used, and this work is exhibited at the end of the term, as individual work. Dr. Cattell spoke of the teacher of operative technics sticking close to the work of the other chairs. It occurs to me that a man who instructs a class in operative technics should inculcate his ideas through the demonstrator of the freshman class. The three years' course in our college does away entirely with the necessity of a young man taking any preliminary work in the office. This, of course, gives the student such a thorough familiarity with the work that he will find no difficulty, when he reaches the infirmary, for practical work.

DR. ROSE, Ontario, Canada. I feel very much pleased at having heard that paper. I am very sorry that I do not see more of the practitioners of Ontario, Canada, present. We have adopted in the Royal College of Dental Surgery, in Ontario, a three years' course for our students, and I sincerely hope that in all future teaching the firm foundation will be laid during the first session. I think this is the greatest essential for success, and I think that no three terms can be successful, without this careful early training.

DR. THOMAS WEEKS, Minneapolis. I wish to urge the importance of the student of dentistry at once entering a college rather than taking private instruction under a professor. There are, I recognize, men in the profession who are born teachers, but the majority of men who are willing to accept young men as students have use for them only as laboratory assistants, and the amount of instruction that your man receives is not commensurate with the services that he renders. He is not started in a systematic way. It is fair to presume that the teachers in a college who are making teaching a study are better qualified to start young men in the right way than the practitioner who is simply practicing dentistry as a means of livelihood.

DR. CARLETON said that the teacher of operative technic should be an associate of the chair of operative dentistry. I go a step

further; I say that the chair of operative dentistry should at least direct the teacher of operative technic. In other words, I think it is important that the man who has a clear idea of the teachings of operative procedures from first to last, should take the "primer class," that the beginner should start under the best man, and the best man should be the professor of operative dentistry.

It is important that the technical teaching received should be carried out sequentially. It is important that when the young man enters the infirmary to practice upon patients, he should be directed by one at least in full sympathy with him. There are points that can be intrusted to a subordinate, to one who graduated last year, or possibly one who has not graduated at all, who has shown a special adaptability; but in the student's first operation, the teacher or professor of operative dentistry should start the man and the assistants should be relegated to minor divisions, all along the line.

I wish to make this suggestion in regard to cutting the sections after they are mounted upon the block. I precede the cutting by some instruction in instrument-making. I have the students make some delicate canal-instruments, such as canal-broaches, of piano-wire. They are easily made, and if they spoil one they can easily make another. To anyone who has ever cut sections, they will know it is most easy to enter the pulp-chamber first; after having entered the pulp-chamber the broach can be inserted into the canal or canals, as the case may be, and this gives the student some training in the feeling of a broach in the canal. It gives them manual training, technical training in broaching canals; and the broach may be left in the canal and we may file until it is reached, which obviates the occurrence of that which I have found to be frequent with the novice—the destruction of the canal before they knew they had reached it. They strike the steel and they know they have reached the canal, and that warns them to be careful. There are two points that might be added to the efficiency of a silhouette print. Dr. Sudduth suggested to me that I might cut a narrow groove which would outline the enamel. After the student has prepared the section ready for printing a silhouette, I use a very fine wheel-bur, and destroy the stratum granulosum, leaving a very fine slot. I start at the gingival line, and cut away the dentine, the width of the bur; the line is all at the expense of the dentine, leaving the enamel outlined when printed. This shows first, the gingival line, indicating the thickness of the enamel. This shows in the individual specimen the comparative thickness of the enamel on the different portions of the crown. These, com-

pared with similar prints of other teeth, show the relative thickness of enamel of the different teeth. It also shows when you come into a crown-work the form of the dentine. In reading the various text-books hastily, we might be led to infer that the dentine gives us the form of the tooth, which every student of sections and section-cutting knows is not so. The dentine is conical in most cases, while the complete exterior form of the tooth may be markedly bell-shaped.

There is another point I think has not been sufficiently emphasized in the paper. That is instrument-making and sharpening. Those of us who have practiced in cities, and can get to the dental depot and get the most approved instruments at a moment's notice, do not appreciate how important it is to have such knowledge.

I think also the student should understand the quality of the material, so I have incorporated in my technics some lectures and instructions by demonstration, of steel, what steel is, and the percentage of carbon that the instrument of steel should contain; the colors that indicate different degrees of hard-temper, how to temper an instrument, and how to use a file in shaping an instrument. Then I give some little explanation by diagram of the different angles for the instruments in the cutting of different kinds of enamel or dentine, and for scraping.

It has been urged not only in this paper but in much of our literature, and upon the floors of our associations, that the student should be required to do his first work only with hand instruments. Now, I differ in all honesty with the advocates of this system. The dental engine is an important portion of our armament, and while not deprecating the importance of hand-training, which should receive full attention, yet the dental engine is used, and the moment the student leaves our hands he will pick up the dental engine and use it to the exclusion of everything else. I think less harm will be done than if we compel him to use only hand instruments, and allow him to go out and go to work upon patients and attempt to instruct himself. I think the technical course is the place. Another feature that I have adopted in my course, and which I know my friend, Dr. Cattell, has, but which he has omitted to mention; that is the classification of cavities, and instruction in the classification of cavities before their preparation.

DR. H. A. SMITH, Cincinnati. I want to bear testimony to the statement made in the paper that the teaching of technics in the manner described is a real advance in the method of teaching, and I know the student that has taken this training comes to the chair of the patient a much more intelligent operator than without it. I

might go further, and suggest that some practitioners and myself might be benefited by going through a course of technics. In the simple matter of root-filling, about which we hear so much, the student who has mastered the cutting of teeth as laid down and taught now in colleges, will not meet the exaggerated difficulties which we hear.

DR. GALLIE, Chicago, stated that he could bear testimony to the advantage of this department of study as one who had benefited by the system of Dr. Cattell, and he recommended the systematic pursuit of the study to all students and even practitioners who have never practiced this method of cutting the teeth, thereby becoming more intimately acquainted with the different classes of root-canals and their peculiarities.

Not only is this course of benefit in regard to the treatment of root-canals, but in every other branch of operative dentistry.

The chairman then called upon Dr. Black to come forward and speak upon the subject.

DR. BLACK said, "I do not know that I wish to discuss this subject, but it does me good to hear it discussed. Not very many months ago I worked very hard over this subject and talked about it, almost against the wind, as is sometimes said. Many have I talked with about it who seemed to regard it as a wild scheme, but the work was begun, and with Dr. Cattell's help it was made a success. Its benefits seem to have been demonstrated, and now I think it does not require pushing, but it still requires discussion, comparison of methods, and so forth, that it may be improved, and I hope it will continue to be improved. It is very young yet, and its full good has certainly not yet been demonstrated. The other department of prosthetic technics is going along with it, not in this discussion perhaps, but is following the same path and is doing the same good.

"A good, not only to the student of the school, but a great good to his patients who come to school to be treated. For the sake of humanity, these boys require this training before they go to a patient."

DR. CATTELL, in closing the discussion, said: "The paper must only be considered as a syllabus. I said the course took now six months, and in that six months there is ample time for many little details that cannot be spoken of in the paper. I have received many suggestions from Dr. Weeks, and many others who are interested in this work, and I want to take this occasion to thank all of those who have made such suggestions, some in writing and others verbal,

which have been picked up and worked on somewhere in that course until it has extended it to six months' time."

THE CHAIRMAN. The Section of Operative Dentistry will now adjourn *sine die*.

At the close of the meeting the representatives of eight schools interested in teaching dental technics met and organized the Association of Teachers of Operative and Prosthetic Technics. After electing Dr. D. M. Cattell president, Dr. J. A. Dale secretary, and appointing committee on by-laws, the meeting adjourned to meet at the call of the president. All schools, members of the Association of Dental Faculties, are invited to join.

SECTION VII.—PROSTHESIS AND ORTHODONTIA.

The Section was called to order at 3 P.M., Dr. C. L. Goddard in the chair.

Dr. Geo. V. I. Brown, Duluth, Minn., read the following paper:

PRUDENCE AND GUTTA-PERCHA IN CROWN- AND BRIDGE-WORK.

My desire is to avoid, so far as possible, the detail of mechanical construction, and deal with the broad underlying principles that govern the attachment of a foreign substance to a root in the living mouth, as a substitute for nature's perfect crown-work, and the yoking of one tooth to another to support substitutes, and calling upon them to perform duties belonging to the full number.

Experience has certainly given this class of work an unquestioned right to be considered among the useful and therefore reputable operations in the oral cavity; and the query naturally arises, "What has been the effect of this introduction upon the general practice of dentistry?" and a glance at the record seems to prove that the result has been a marked one both for good and for ill.

The benefits have been the preservation and restoration to a state of usefulness of many roots and broken-down crowns of teeth that would otherwise have been lost, thus putting off the evil day when artificial dentures would be necessary.

Again, the result of this effort to utilize such roots has more than anything else influenced the wonderful advance in the therapeutic methods by which they are restored to healthful usefulness, and diseased conditions removed.

An advance has been made, in that while the average dentist was almost totally ignorant of metal plate-work, to-day every student is required to have sufficient skill in this direction to be able at least to make an artistic-looking gold crown. On the other hand, instead of acquiring greater perfection in filling, the temptation has

many times been too great to cover teeth with large cavities but good remaining structures in this manner, until the wholesale destruction of natural crowns that might properly have been filled is something to look upon, and unless the tendency be checked yet more terrible to contemplate in its future aspect.

Many times, too, there has been a total loss of good roots and even whole teeth, through injudicious attachment for the purpose of sustaining a strain they were unable to bear.

It is a well-known principle that a thing can be no stronger than its weakest part. This in crown-work would mean that the following points particularly need protection, which the perfect crown must provide.

First: Attachment to secure without fear of dislodgement.

Second: A natural appearance if for the anterior teeth.

Third: Provision against the action of destructive agents at or near the gingival line.

Fourth: Secured against danger of splitting by a band, or its equivalent, by forming the joining surfaces of root and crown in such manner as to equalize the strain.

Fifth: The imitation of the natural form of the crown upon approximal and occluding surfaces.

Bridge-work embodies dangers, increased proportionately to the greater strain it is necessarily called upon to bear and its difficulty of adjustment, with the added risks of the perhaps doubtful capability of a few roots to perform the natural service of several, besides having to support the sometimes not inconsiderable weight of the attachment, and must be so formed that the collection of particles of food and other readily decomposed matter between the bridge and the membrane covering the ridge under it, may be avoided by making the surface self-cleansing so far as possible.

Having enumerated the requirements, an examination of the various methods seems to be in order, and I begin with the broad-sounding but quite true statement, that crowns inserted with any of the oxychlorid or oxyphosphate cements, without band or other protection at the joining with the root, no matter how secure the pin may be, must be considered as of a temporary nature, for no matter how perfectly the surfaces may be adjusted, disintegration will surely follow, and not only cause loosening of the crown but allow more or less destructive action upon the root itself.

The use of amalgam as a setting is, of course, a great improvement upon cement in crowns of this class, but even amalgam is not always proof against bacterial influences at that critical point, the gingival line, as shown by the frequent failure of fillings. The force

of the jaws applied in general use, or an accidental blow, not infrequently causes that most serious of possible troubles, the splitting of the root perhaps beyond repair, unless these crowns are protected with a band, a thing not ordinarily practicable in using amalgam, or by making the end of the root convex, and having a concavity in the crown to fit over it, by grinding slanting surfaces externally and internally from a point in the center, giving a "V" form, or taking some other precaution to equalize the strain so far as possible, and distribute its effects all around the root instead of being applied to one side without the assistance of the support of the other.

The Logan, Bonwill, How, and other *all*-porcelain crowns most commonly used with cement and amalgam as described, have certainly the advantage to some extent in natural appearance, which must be conceded for the six anterior teeth over other methods which require the use of a plate-tooth with backing.

Noting the value of a band for the security of the crown, a special consideration of its application is next demanded.

The perfectly fitting band, as described by the facile pens of writers and the positive statements of discussors of the subject, to the experienced mind, must be much modified to conform to the hard facts of daily practice. Granted that upon a single reasonably sound root, ground down and stripped of its enamel, with the gum in a normal healthy condition, a band can be so fitted that when set with cement there will be but little if any fear of disintegrating action of the secretions; grant still further that this would also hold good where two such roots were situated in the mouth in suitable position, so nearly straight in the jaw as to admit of the completed piece being passed over each at the same time and in the same direction, then ask ourselves how many of all the broken-down and once diseased roots that we desire to save would correspond to that description, and of all the bridge cases we have and are caring for, in how many are the roots so conveniently situated; add to these the consideration that in all other cases more or less opportunity must be offered for the secretions to act upon the cement, knowing as we do that it offers but very uncertain resistance to such action, and we realize at once this weak point in present methods, and the need of some improvement in this direction.

The teachings of Dr. Flagg and his followers, while perhaps going farther than could be generally recommended, have at least been instrumental in establishing the value of gutta-percha in its capability to withstand the action of the acids of the mouth, and as a preservative against caries even where every other filling-material would fail; its only disadvantage being that it wears away too readily

in exposed positions; but while its good properties are of the first importance in crown-work, the softness does no harm, because it is protected from wear and will not disintegrate. The advantage may be summed up before proceeding to more detailed description under the following heads:

First. It is impervious to acid secretions or bacterial influences.

Second. Not irritating to surrounding tissues.

Third. Easily removed when necessary.

As against these three there is simply one consideration, viz., the difficulty of adjustment. The value of these properties can best be understood by contrasting with other methods generally advocated.

The system once so positively advanced, but in the light of civilized progress apparently losing advocates, which required the snapping off of natural tooth-crowns, the destruction of pulps by driving a wooden point into the living contents of freshly uncovered canals, and the withdrawal of the pulp with the wood, is to my mind unprofessional to a degree bordering closely upon the barbaric.

The most elaborate piece of amalgam work that I have ever seen, having been under my observation for some months past, has convinced me that first of all such manipulation in average hands would be out of the question; and while I doff my hat in deference to the wonderful ingenuity and great skill which enabled the well-known operator to build solid masses of amalgam from one loose tooth to another, and even across the vacant spaces where teeth had been lost in both jaws, anchoring it firmly, and building up most shapely dummy crowns of this material, it did seem to be a most unnecessary expenditure of talent in view of simpler and much safer methods.

Dr. E. Parmly Brown has undoubtedly done much with his system of porcelain bridges anchored with gold fillings, malleted about a bar extending into the tooth, and here again is an example of what individual skill can do; but from the standpoint of the less skilful average practitioner, there are some points which seem to need criticism in comparison with other needs.

For firmly fixing the position of teeth loosened by pyorrhea, bands carefully fitted, soldered together, and cemented in place are a step in advance, but they also allow the pressure upon the crowns to work to their disadvantage, and the cement gives out so soon that they can hardly be considered of any paramount value.

Filling with gold about a gold wire imbedded in the cutting-edges of lower incisors is not only an exceedingly laborious, but

it is also a difficult and uncertain operation to impact the gold securely when the teeth are not held so firmly that movement is next to impossible; and it is almost an impossibility to do it, because not only are such teeth capable of forward and backward, lateral and circular movement, but upward and downward as well, and thus making a very poor resistance to the necessary force in condensing the gold, without which the operation is valueless.

The anchoring of amalgam upon each side and building across from one to the other, even in most skilful hands, seems to be insufficient except in very favorable cases, besides being, as already stated, most unsightly. But by dressing the sides of the tooth as straight as possible up and down, grinding enough of the cutting-edge to allow of a covering of gold without interfering with the occlusion, and beveling to let the enamel-edge hide so far as possible the gold covering, a metal die made from a cast and perfect impression, the crown of gold plate struck up and made to accurately fit the cast, and the front part afterward cut out, these all put in place in the mouth, an impression taken and all soldered together, then set with gutta-percha, the result is that each tooth not only is firmly held in position with its neighbor, but the edges are so covered that no upward and downward movement can occur, and we know that gutta-percha, while it may wear off a little at the exposed edges, will not disintegrate under the gold covering, therefore that operation may be regarded as a permanent one, beside being less unsightly than most of the other methods, which do not require cutting off the tooth.

This method applied to the abutments for bridges where any of the anterior teeth remain in a condition sufficiently sound to warrant preservation of the natural crown, avoids the destruction of nature's handiwork as shown in a living, nourishing, healthful pulp, and natural tooth-structure, gives an attachment that is absolutely secure, and proof against every force that may be applied without fear of checking porcelain fronts, can be carried up beyond the gingival margin, left a little short of it, or taken to the enamel line just as the surrounding conditions seems best to warrant, because of the trustworthiness of gutta-percha under fire of the secretions.

To one accustomed to use cement for this purpose, the difficulty of applying gutta-percha as a substitute seems almost insurmountable; but a moment's recollection of the trials attendant upon the setting of his first crowns will recall the fact that cement too had its difficulties for the beginner.

For gold crowns, where teeth are covered entirely, I prefer the red gutta-percha we get in form of sheets. It has a degree of

toughness that is valuable, but for anterior crowns with open faces the red line at the edge of the openings is undesirable, and I therefore use some white preparation that softens at a low temperature, as this property greatly facilitates its handling in the mouth. There being no danger to apprehend from wear, hardness is not so desirable as for filling.

It is my custom to heat both crowns and setting-material upon a tray to protect from the open flame, spread with warm instruments a thin coating over the inner surface of the crown, which should be first roughened on the inside by scratching with an instrument, aiming to have as nearly the exact amount necessary as possible, but depending upon a vent to get rid of a small amount of surplus; then after drying the surface of the teeth with alcohol and warm-air blast, wipe with some suitable germicide, saturate a pledget of cotton in eucalyptus, coat the surface with it to prevent the too rapid drying of the chloro-percha, of which a thick solution is then applied around the neck, so that when the crowns already heated as hot as they can be handled in the fingers, and prepared as described are driven home, the eucalyptus, chloro-percha, and gutta-percha in the crowns will form a thick creamy mass that will penetrate and perfectly fill every space about the necks, and even if surplus be not removed afterward, will not cause irritation as might a particle of cement in the same position.

Sometimes too much gutta-percha will prevent the crown going quite into the proper position, just as sometimes happens with cement; but the remedy is much simpler, because easily removed while still warm; or if, for accidental or other causes, removal be desired afterward, hot water or hot air applied will in a short time heat the metal sufficiently to soften the material and facilitate the separation without the necessity of damaging the crown, and anyone who has tried to pull them off without first warming will be quite satisfied that any properly adjusted crown can be securely held in this manner.

DISCUSSION.

DR. J. A. DUNN, Chicago, asked the essayist if he had ever had trouble in putting on crowns because of the difficulty of exactly judging of the exact amount of gutta-percha which would be needed.

DR. BROWN said yes, frequently, but that with gutta-percha it was an easy thing to remove the crown, take out some of the gutta-percha and soften and slip it on again. With cement it was just as likely to happen, and the removal was a work of considerable trouble.

DR. DUNN asked if he had ever experimented with oxyphosphate cement combined with a chloro-percha in crown and bridge-work.

DR. BROWN said he had, but had found that the cement would disintegrate. He had used it for cementing porcelain inlays with good results.

DR. A. E. MATTESON said he had had considerable experience with the use of gutta-percha in fixing crowns to natural roots. He used the base-plate gutta-percha as gotten from the depots, and moistened it with eucalyptus oil. He used the eucalyptus oil prepared by Saunders of London, for he found that as prepared by some dealers it would not soften the gutta-percha. He did not make a solution of it as in chloro-percha, but used it as you might a lubricant, moistening the root with the eucalyptus and filling the crown with as much gutta-percha as he thought necessary, and allowed the bite to force it to place. If there was not the right quantity of gutta-percha, the crown could easily be slipped off and the correction be made. It was difficult to heat the crown so as to soften the gutta-percha without running a danger of cracking the tooth, but with this method the crown could be lifted off without heating. To set the crown originally he heats in a sand bath.

One of the advantages of using gutta-percha for cementing crown and bridge-work to the natural teeth is when in after-years the supporting tooth needs a filling, which is a frequent necessity; then the gutta-percha can be easily softened by the application of a pair of forceps, the beaks of which have been heated, and the crown lifted off.

DR. DUNN said that he was in favor of setting crowns with gutta-percha. He thought there was less liability of pulpitis in the case of a crown on a tooth with a living nerve when it was put on with gutta-percha, as this material was a defense against the shock of thermal change.

DR. GODDARD, San Francisco, said he had had no experience with setting crowns with gutta-percha, but years ago when pivot teeth were in use he would put a coating of gutta-percha over the top of the root to fill up the interstices between the pivot tooth and the root. In theory we made the fit exactly, but practically it is impossible to do this. The gutta-percha, however, filled it perfectly and kept all moisture out, with the effect of preserving the tooth. He also set the Logan crown in the same way, and is convinced that it is the best way. He considers Hill's Stopping the best gutta-percha for the purpose. With the Logan crown it fills securely the space

between the pin and the wall and the space between the crown and the tooth; if an excess is crowded out it can be trimmed away when it gets hard. Flagg's "Low Heat" gutta-percha is perhaps even better than Hill's Stopping; it takes a little more heat to soften it, but it is harder and firmer.

DR. MATTESON, Chicago, advocated the use of gutta-percha and the oil of cajeput for root-filling. He described a method of heating a band of a crown for the purpose of removal, by a minute flame produced by the burning of alcohol on a fiber of cotton projecting from a drop-tube. The flame, not larger than the point of a pencil, could be directed against the crown without danger of burning the surrounding tissues, and heat sufficient to soften the gutta-percha would quickly be produced right where it was wanted.

DR. BROWN was asked what means he used to heat a crown that had been on for some time, when he wanted to remove it. He said that he used to employ hot water and a syringe. It was necessary that the water should be so hot that the patient was liable to complain of the heat. In order to lessen the shock he would usually have the patient rinse out the mouth first with water as hot as could well be borne, then the shock of the still hotter water from the syringe would not be felt so much. Now he uses the Richmond hot-air apparatus, and, putting napkins in the mouth to protect it, heats the crown quite hot and lifts it off.

DR. OLIVER thanked the essayist for the paper. He said that gutta-percha had recently fallen into disfavor with the dentists and he was glad to have its good points brought out, as it was too valuable to be allowed to fall into disuse.

He thought it best in setting a crown to leave about one-eighth of an inch between the margin of the band and the gum, because it would be more easily kept clean.

DR. BURNE, Sydney, New South Wales, said that thirty years ago Dr. D. D. Smith was teaching students in the Philadelphia Dental College to fasten pin teeth in roots with gutta-percha, and to his own knowledge those teeth were serviceable for years, and when one of them broke it could be taken out and a new one put in. He commended the paper, and was glad to note the tendency to return to gutta-percha, from oxyphosphates. When he had to remove a bridge which had been fastened with oxyphosphate he always found a very disagreeable odor permeating the whole mass of the cement, and this was not true in case of those fastened with gutta-percha.

DR. W. P. SMITH spoke of a case of his for which he had made bridges for both the upper and lower jaws. He found the lower bridge worked loose, and replaced it with oxyphosphate cement to

strengthen it and gutta-percha for cementing the bands onto the teeth.

Discussion closed.

Dr. Geo. J. Dennis, Chicago, Ill., read the following paper:

A STUDY OF THE MASTICATING FORCE OF THE JAWS.

The original intention of this paper was to bring to the dental profession some accurate knowledge in regard to the strains, direct and otherwise, which were borne by the teeth, more especially when artificial substitutes, such as crowns, bridges, and appliances of like nature, have been placed in the mouth. In the case of bridge-work the amount of strain each would bear was sought, whether there would be any deflection of the center or extremities of the bridges from the pressure of mastication; whether the bending, if any, of the superstructure would have any effect on the substructure; whether there would be any movements of the abutments in their deeper foundations, and if such movement existed, the amount of movement, as well as the strains, and the deflections to which bridges might be subjected under the existing conditions in the mouth was confidently expected. It was hoped that some scientific knowledge might be gained of the stableness or unstableness of bridge-work, judged entirely from the mechanical standpoint. The subject was thoroughly investigated. Competent civil and mechanical engineers were consulted, but all acknowledged that the solution of the problem was entirely beyond them for these reasons:

1. Absolutely nothing was known concerning the resistance to strain, either direct or torsional, of the material (gold) used in forming the superstructure of the bridges. Its elastic qualities were also unknown quantities.
2. The supporting beam in dental bridges constantly varies in size and shape, so that no calculation could be made as with a square or triangular or even rectangular beam of even size and shape throughout.
3. The varying density of the material of this superstructure, composed as it usually is of two, three, and four grades of gold, presented a combination upon which no calculations could be based.
4. The method of attachment of the superstructure to its abutments was an unknown factor and incapable of solution, for its strength must vary extensively with the peculiar conditions present in each individual case.
5. The strength of the substructure was one of such great variability that nothing could be determined in regard to it.

Previous to this, the writer had under construction an instrument designed to contribute to a solution of the problem, by giving accurate information upon the amount of force exerted by the maxillary muscle in the closure of the jaws. No information had ever been given us in regard to this force, and it was with the intention of presenting some facts in regard to this matter that this paper has been prepared. Indeed, Prof. Black at the last meeting of the Illinois State Dental Society, in an article entitled "Anchorage of Proximate Fillings in Bicuspid and Molars," published in the June number of the *Dental Review*, thus refers to the subject: "What is this strain? I can, with my right hand, grip one hundred and twenty pounds, as measured by an apparatus designed for that purpose. With what force can I close my jaws? So far as I know, we have no apparatus for measuring the bite, and in the more scientific sense it remains an unknown factor. It must, however, be much greater than the grip of the hand, and amounts to hundreds of pounds. Hans Block, of Dresden, Germany, in his papers on mastication in the DENTAL COSMOS, 1893, page 187, states that some acrobats can close the mouth with a force of five hundred pounds, and that ordinary persons can exert a force of three hundred pounds. But these statements do not seem to be based on accurate determinations."

In the discussions which followed the paper, Dr. J. J. R. Patrick stated that during a visit to the iron regions of Pennsylvania he had the privilege of testing the amount of pressure necessary to break nuts of various kinds, in the machines used in the large iron-works for testing the resistance of their output of iron and steel, and he found that one hundred and twenty pounds was the greatest pressure required. Similar nuts, as closely resembling the broken ones as possible, were then given to the strongest of the workmen to crack with their teeth, but each failed in the attempt. He judged from this admittedly crude experiment that the force of the jaws must be less than the one hundred and twenty pounds, registered by the testing machines.

Acting upon this valuable hint, the instrument was then prepared with a register of ninety-five pounds, and tests were conducted to determine the actual masticatory force of the maxillary muscles. So far but one person has been found who could accomplish the full register. From forty to sixty mouths have been examined. The range of the indicator when placed between the molars of the adult jaw was from sixty-five to eighty-five pounds, occasionally but rarely, passing from eighty-five to ninety-five pounds. Between the bicuspid the force is found to diminish from five to fifteen pounds, the

range extending from fifty to sixty-five pounds. Between the incisors the range extends from thirty to fifty-five pounds, showing a further diminution of about twenty pounds, as the pressure was applied at a greater distance from the location of the power.

Among children whose ages range from eight to fourteen years, a peculiar fact was noted in that the greater force was applied through the incisors rather than through the molars. The force exerted in these cases ranged from twelve to twenty-five pounds upon the anterior teeth, while upon the posterior the range was from ten to twenty pounds. The cause for this state of affairs is that during these years the permanent incisors have become firmly fixed in the jaws, while the temporary molars are being absorbed, their roots lacking the usual strength, which by reflection caused a less force to be exerted by the muscles of the jaw.

In the mouths of persons wearing plates, the amount of force exerted was still less, ranging only from five to twenty pounds.

These figures apply to the greatest force that the jaws of persons of average strength exert. It is the belief of the writer, based upon experiments in his own mouth, that the actual pressure exerted by the jaws in the ordinary movements of chewing the food is only about one-half that of the figures given above, while in most cases in which the food is not properly masticated the force exerted will be found to be only one-third or even one-fourth that of the figures.

Thus it will be noted that our preconceived ideas in regard to the masticating force of the jaws have been greatly at variance with the actual facts. It is the hope of the essayist that the facts here set forth may be of service in the future in the study of strains placed upon fillings, crowns, and bridges, and all artificial dentures of whatsoever kind. As his observations become more extensive, further statistical information will be furnished through the medium of the dental journals.

There was no discussion, and the Section adjourned.

SECTION VIII.—EDUCATION, LEGISLATION, AND LITERATURE.

Dr. Patrick, the chairman, called the meeting to order, and as there was not a quorum present, the motion was made and carried to adjourn.

The following paper by Miss Martine Magnus, of Christiania, Norway, was on the program for August 17, but was not read for lack of time:

DENTISTRY IN NORWAY AND THE USE OF COCAIN AS A LOCAL ANESTHETIC.

As it seems to me that the conditions under which dentistry is practiced in our country are almost unknown in America, I will try to treat this subject briefly. Since 1857 we have had our own regulations for dentistry and for examinations, which are held in Christiania, the capital of Norway. During the last years these regulations or rules have been rendered more and more severe, and greater efforts are being made now. What we are still wanting, and what we are trying hard to get, is a school of dentistry for our students, who, under the present conditions, are obliged to work during three years without interruption for an examined and authorized dentist in Norway. Provided with a certificate signed by such a dentist, that one has worked during the time required, one is allowed to submit for examination; without having passed this examination nobody can practice in this country.

The public examination is passed upon by a commission, composed of two doctors and dentists. The applicant has to give proof of his knowledge orally and in writing. It is necessary for him to have a perfect knowledge of the frame of the body, its anatomy, histology, and physiology. It is especially required that he shall be acquainted with the anatomy and physiology of the teeth, jaws, mouth, and surrounding parts, the ordinary and the special pathology and therapeutics, including pharmacology of the teeth, jaws, and mouth. He must further understand the different methods of operating, use of instruments for extracting teeth, the treating of ordinary materials for filling teeth and of prosthetic material, chemistry, metallurgy, and physics. Besides this, the applicant must show specimen operations in gold fillings, filling of roots of the teeth and pulling of teeth, making of casts. Of the latter he has to make a model and a complete set of teeth; one of these sets is made from metal, with teeth soldered on it, the other from caoutchouc.

In 1892 there were in Norway one hundred and thirty-five dentists, among these eleven females; the first female dentist passed her examination in 1872. Norway was the first country among the Scandinavian countries which granted the right for this position to women. We have now a dental association, membership in which can be acquired by men as well as by women. It is the aim of this association to work for the development of our class, and we can already see a good progress.

It has always been the desire of our art to find a remedy which would entirely or partially kill or diminish pains caused by an oper-

ation, and for this purpose it seems to me, notwithstanding that many of my colleagues refuse this remedy, I believe that cocain is one of the best remedies. I have had it in use for four years, every day, and in various and most distinct cases, and have observed the following results. It produces a very satisfactory effect in most cases, especially for extractions and for all operations on the soft part of the mouth; the least effect is perceived in the dentine, but in inflammation of the pulp it produces the desired effect. It has been asserted and proved more than once that cocain may become dangerous, and even has resulted in death, but I wish to say that I for myself have never had such an experience.

When I first began to apply cocain, I used a ten per cent. solution, but then I experienced very often, in consequence of it, that my patients suffered from palpitation, or that they more or less swooned away for a short time, after which a certain weariness was perceptible. The latter lasted once for two days. I cause the patient, in each case, to stay with me for such a time that I may feel sure that no disagreeable consequences are liable to follow after he has left me.

Later I administered a solution of seven per cent., at present a five per cent., of which I give to the patient, according to age and disposition, from one-half to one grain. I have even with a five per cent. injection drawn three teeth, by dividing the cocain into three equal parts, but in this case it was a patient whom I knew, and where I was certain that the cocain would exert its influence only slightly and for a short time; he was a man forty years old.

At first I brush the gum with a twenty per cent. solution, and then after a few minutes when the gum becomes insensible to the puncture of the instrument, I inject one-half of it on the lingual side of the tooth near the root of the same, and after five minutes I draw it. It proves less successful if a strong periostitis prevails. I may also add that I believe that the individual effect of cocain is because the same quantity, given under proportionally the same external conditions, does not always give the same result, but nevertheless the pains are in each case so considerably lessened that the patient always assures me that the method is a much better one than drawing teeth without cocain. In case of tumor of the gum and during their treatment, cocain proves to be very effective if often used in the aforesaid manner. It may also be used with favorable results for cleaning the teeth, because the gingiva is very sensitive, but it is without effect on the sensitive dentine, while I have treated a very sensitive pulp and finished my operation without causing the least pain to the patient.

After personal experience gained in the use of cocain, I feel safe to use it wherever it is needed, and I will continue to use it until medical science shall have found a positively not dangerous and effective remedy.

Cocain has so often helped me to calm the most impatient people, that I shall always use it.

DEMONSTRATIONS AND CLINICS.

DR. BARRIE exhibited an electric mallet devised by E. Bidaud, of Paris. This mallet has the interrupter so arranged that closure of the circuit is made when the plugger-point comes in contact with the filling. This secures the delivery of a single blow at the moment when applied, as in the Snow & Lewis automatic, and not a continuous series of rapid blows, as in the ordinary electric mallet. The force of the blows is controlled and graduated from light to heavy at will.

He also exhibited an electric stomatoscope, in which illumination from a small electric lamp, encased in a hard-rubber cylinder, is projected through a glass rod, the free terminal end of which, about five to eight centimeters in length, is ground hemispherically in shape, and so acts as a strong convex lens. The light, when projected through this rod, gives a powerful illuminating effect, and several of these rods, with various curvatures, are provided, so that all parts of the oral cavity, and in fact any of the cavities of the body, may be illuminated thereby.

The great advantage of this instrument is the absence of any danger of breakage, or of any appreciable rise of temperature, at the point where the light is delivered.

DR. C. C. CARROLL inserted an aluminum amalgam filling, demonstrating the use of the Carroll-Campbell engine and hand piece.

He removed an amalgam filling inserted about two months ago, which showed signs of disintegration at the cervical border, because of the want of careful finish. He allowed that part of the filling next to the pulp to remain, as he feared that he would expose the pulp if he removed it all.

Aluminum amalgam, he claims, is not subject to discoloration in the mouth, and will not be affected by galvanic currents, when there are other metallic fillings in adjacent teeth.

Dr. Carroll also gave an exhibition of his method of casting aluminum plates.

Dr. Caracatsanis removed six teeth from the mouth of one patient, securing local anesthesia by the application of pure cocain

crystals to the gums. It took comparatively a long time to produce anesthesia, but the result was apparently successful.

Dr. L. C. Bryan, of Basle, Switzerland, demonstrated the use of his forceps for the immediate correction of irregularities. The tooth operated upon was a right superior lateral. The operation consists in cutting the process around the tooth to be moved, then placing a stout piece of metal the shape of the exterior of the arch around the teeth, and with the forceps moving the tooth up to the line, and ligating it in its correct position, local anesthesia being produced by the injection of cocain.

SIXTH DAY—GENERAL SESSION.

The meeting was called to order at eleven A.M. by the president, and the secretary-general read the following resolution from the Executive Committee:

"Resolved, That the thanks of the members of the World's Columbian Dental Congress be extended to the Hon. C. C. Bonney, president of the World's Congress Auxiliary; Clarence E. Young, secretary, and Eugene J. Hazard, private secretary to Mr. Young, for the courtesies shown us during our stay in Chicago."

The president stated that the reports of the committees below-stated would be read by title only, and would appear in the printed report of the proceedings of the Congress.

Committee on the History of Dental Legislation in this and other Countries. Wm. Carr, M.D., D.D.S., New York, chairman.

Committee on the Care of the Teeth of the Poor, by T. H. Parramore, D.D.S., Hampton, Va., chairman.

Communication on the Dental Uses of Cocain, by Dr. Viau, of Paris, France.

The topic for discussion: "What Relation shall Dentistry hold to Medicine," was then taken up.

DR. J. D. PATTERSON, Kansas City, Mo., said that while during past years the discussions on the subject had been quite frequent, he had engaged in them but little, because he did not deem that the cause of dentistry would be hastened by many of the discussions that had been held. He thought the most rapid progress had been made by dentists as an independent profession, without, however, detracting from the fact that dentistry is a specialty in medicine.

DR. J. Y. CRAWFORD, Nashville, Tenn., would prefer to discuss the question, What relation *does* it hold to medicine? That it is a part of the healing art there can be no question. If the question as formulated means the attitude the dental profession shall stand in

relation to the medical profession in scientific and practical work, in furthering the interests of humanity as embraced in the healing art, he should think it appropriate. Dr. Patterson seems to intimate that the work in the medical profession had not been as efficient as it might have been. There is no doubt that the most that could be accomplished by associated work would be to have a well-equipped Section in dental and oral surgery in every medical organization in the country, and by bringing together those who are earnestly working for the advancement of the healing art in general and men who are capable from a dental standpoint of impressing upon the medical profession the importance of dental surgery, we should get the full recognition of the idea that dentistry is of a piece with hygiene from beginning to end, and that the perpetuation of civilization depended largely upon it. Dentists should be more thoroughly prepared for the treatment of all facial injuries than many of them are.

DR. FLETCHER, St. Louis, thought that dentistry should be taught and learned in institutions conducted for that alone, as attending the lectures and instructions in a medical college did not afford the proper opportunities, the medical students receiving first consideration.

The subject was then passed.

The report of the committee on Prize Essays was then read, awarding to Dr. George Cunningham, of Cambridge, Eng., the prize for the best essay on Oral Hygiene and recommending that the medal be awarded to him.

The president then with a few fitting remarks pinned the medal on the lappel of Dr. Cunningham's coat, stating that it would hereafter be suitably engraved. The medal consisted of a gold bar to which was suspended a plate, the token being of solid gold throughout.

Dr. Cunningham expressed his gratification at having received the prize.

DR. GODON, Paris, France, read a series of resolutions signed by the different foreign representatives, expressing their thanks to the different members and those connected with the Congress for the many courtesies received.

DR. FLORESTAN AGUILAR, Cadiz, Spain, on behalf of the foreign delegates moved that they express their thanks and appreciation of the courtesies received at the hands of their hosts, which was carried.

The registration was announced as 116 foreign and 999 American,—total 1116.

The chairman of the Executive Committee having been called away,

DR. J. TAFT, Cincinnati, was called upon to address the meeting as the representative of the Executive Committee. He said the work done by the Executive Committee since its appointment two years ago and more, has entailed anxiety and great labor. Under the most favorable circumstances there would be anxiety in the minds of those who have such a work in charge; but there were adverse circumstances to overcome, some actual, some which threatened greater obstacles than did really happen. In the main these have all cleared away, and we have a grand and undisputed success and a far greater attendance than was anticipated. Even the financial troubles that have swept over our country have not been sufficient to obviate the grand success which we have achieved. It was thought that from five hundred to eight hundred members was all that ought to be expected, in view of the financial troubles, but we have had between eleven and twelve hundred members present. We are gratified that a large number are here from other countries. I voice the feelings and the sentiment of everyone of us when I say that it is a matter of great satisfaction and gratification that we have been permitted to welcome so large a number of our professional brethren from all over the world.

What will be the outcome of this great work? I look upon it as prophetic of the great interest and rapid progress of our profession. Who would have attempted fifty years ago, or even twenty-five years ago, to prophesy such advancement and progress as has been made in the profession? Who can tell what the progress and the attainments shall be in the next twenty-five or fifty years? We dare not prophesy, but we are justified in saying that there will be an upward and a forward movement, and a richer development than has been realized. New things will arise, perhaps in the near future. Let us work on. Let this be a stimulus for us to go forward and do more and more. The door of opportunity is open wider today than it has ever been before, and we should enter and occupy to the fullest extent that which is before us.

Our sisters, our lady friends, have had a door opened to them through which they have entered into this profession. Is this not prophetic of onward movement? People sometimes criticise the entrance of women into this profession, just as they cavilled and criticised when women entered the medical profession years ago. I believe that the ladies of the profession will do work that the men have not done. They will look more to the hygienic aspect. They will have more sympathy for the children, and they will look more to the

oral diseases of children, more to the prophylactic and hygienic efforts that may be made for the rescue and preservation of the little ones from attacks of disease.

Ladies and gentlemen, when we look at what has been done here, when we remember the fact that a larger number and a higher effort has been made here during this week in behalf of dental science than ever before, we should be very proud. If another Congress seems proper, let us have it. The profession is able and capable of doing a great work, and it may be that a greater work than this will be accomplished in the future. I thank you.

The Secretary-General announced that the Executive Committee of the Congress had appointed Dr. E. M. S. Fernandez, of Chicago, as the Spanish secretary for closing the work of this session.

DR. SHEPARD. The origin of this Congress was unique. It did not proceed from an individual meeting of dentists, but from the highest authority in this country. The scheme was one to bring together not a mass-meeting of dentists, but a body of educated men who stood well in the profession and in the community. In carrying out the scheme it became necessary to appoint many committees, and I will very briefly refer to these committees. [Dr. Shepard then briefly recounted the labors of each of the committees, and for their faithful, efficient, unselfish discharge of the duties intrusted to them said a word of appreciation.]

It may be truly said that the work done in this Congress has been most extraordinary. Usually, when there are side-shows or outside attractions, people are taken away from the dry and less exciting professional work of the meetings; but notwithstanding the marvelous attraction so near us, the meetings in this hall have been well attended, the clinic rooms have been thronged, and the Section rooms have been crowded. I think under the circumstances of the extraordinary counter-attractions the attendance of so large a number of members at the sessions deserves special mention, and shows that they came here for dentistry first, and have attended to it, while they were here. The very wise and thoughtful provision made for carrying on the work by those in charge, is the cause of the success of this Congress.

While no one could be more conscious of the honor which this position brings with it, there is also the consciousness that there are many other American dentists who have done infinitely more for the advancement of this country, and of the world. We have mem-

bers who are known throughout the world as original scientific investigators, and their names will live in history, not as presiding officers, but as workers in the fundamental fields of research which make true progress. The president is in this Congress but a figure-head for the expediting of the transaction of the business which had been planned by others, and he desires personally to thank every member for the kindness which he has received at their hands.

The friendships which have been made here will last through life. We have met the eminent men of the profession from almost every clime, and friendship, the result of personal meeting and personal converse, is an immense factor in progress. For the kind resolutions which were passed in behalf of the American members of the Congress, we return our thanks that those who have come from afar have enjoyed themselves and can tell us truly that while the record has been passed of the biggest meeting, the more valuable record of the largest work of progress has also been made.

We appreciate the kindly words of our foreign friends, and trust as they go to their homes that success will attend them, and as the American dentist who is a great traveler shall visit their homes, we know that the warmest kind of welcome will await him at their hands.

Gentlemen from abroad, we are glad you came. We have enjoyed your company, and the bright thoughts and valuable instruction which you have brought to add to what has been gathered from our own shores, and we heartily indorse the movement that in future an exigency like the present shall be the motive for the formation of another World's Dental Congress.

There is nothing now for me to do but by the authority conferred in me to declare this World's Columbian Dental Congress adjourned *sine die*.

At the conclusion of the session, a photograph of the gathering was taken in the hall, after which the members separated, and the World's Columbian Dental Congress was at an end.

CLINICS AND DEMONSTRATIONS.

It had been announced that Dr. W. J. Younger, of San Francisco, would give a clinic in implantation at which he would implant two teeth, and an interested assemblage gathered to witness the operation. Dr. Younger proceeded so far as to dissect away the gum, leaving the process bare and trephining down into the process in order to form the socket for the insertion of the teeth, when an unerupted bicuspid was found in such a position that it was impossible to insert either of the teeth. Therefore the operation was abandoned, and as no other patient was ready the clinic had to be given up.

LANTERN EXHIBITS.

Lantern exhibits were made before the Congress in general session on the evenings of Wednesday and Thursday. For the excellent manner in which the slides were shown, the members of the Congress were largely indebted to the McIntosh Battery & Optical Co., who supplied the apparatus.

Wednesday evening, Dr. R. R. Andrews, Cambridge, Mass., delivered a lecture, illustrated by photo-micrographs, entitled,—

A CONTRIBUTION TO THE STUDY OF THE DEVELOPMENT
OF THE ENAMEL.

In a paper presented before the Dental Section of the Tenth International Medical Congress at Berlin in 1890, I gave the result of my investigation on the formation of enamel up to that time. Since then my study leads me to believe that there exists in the young developing enamel, something that has the appearance of fibers, guiding and sustaining the globules that are excreted from the enamel-cells which are to form the future enamel-rods, upholding and supporting them. An eminent English writer seems to imply that the study of dentine is the more difficult of the two, but my experience teaches me that the study of enamel development and calcification presents vastly greater difficulties. John and Charles Tomes were of the opinion that the enamel was formed by actual conversion of the enamel-cell; that the proximal end underwent some chemical change preparatory to its calcification, and subsequently calcified; that the calcification did not go on uniformly throughout the whole thickness, but from its outer surface toward its interior, the center portion calcifying later than the external. That as this calcification proceeded it also united the contiguous cells to each other. Dr. J. L. Williams, believes that the enamel-organ is glandular in its nature, and a true secreting organ. Appearances teach him that the ameloblasts are the active agents in depositing lime-salts on the periphery of the dentine. In teasing enamel-cells from partially formed enamel, he finds that they show a fiber running out from that end of the cell. He tells us that the enamel is probably formed, not by a change of the enamel-cells into a glue-yielding basis-substance, which afterwards becomes infiltrated with lime-salts, but by a process of secretion and deposition. As the formation of enamel progresses, these cells recede, leaving within the formed enamel what appears to be a fiber of living matter, in the center of the enamel-prism.

Prof. W. X. Sudduth, in an article in the "American System of Dentistry," is of the opinion that during the period of amelification there is no conversion of living tissue into enamel, but that the en-

amel is produced by a process of excretion. He finds that at first the salts of calcium are stored up in the meshes of the stellate reticulum of the enamel-organ, furnishing material for the first-formed layer of enamel. After this, the enamel-organ having disappeared from over this calcified layer, the salts of calcium are furnished by a rich plexus of capillary vessels, which are now found to be in direct communication with the enamel-cells. He believes that the fibrils which have been called "Tomes's processes," are nothing more than semi-calcified material which adhere to the enamel-cells, giving the appearance of a fibril or a prolongation of the cells themselves. He considers them as being mechanically made, for they do not always appear, but depend upon a certain condition of the calcific material. He had succeeded in demonstrating them in the enamel-cells of pigs' teeth, where they showed very plainly, indeed, being nearly or quite as long as the cells themselves, and several times longer than the enamel was thick. As a rule, he finds that the enamel-cells separate from the forming enamel so as to leave a comparatively smooth line. He has never been able to demonstrate processes that would lead him to infer the least analogy between them and the fibrilla of odontoblasts. He seems at a loss as to how to regard the cells of the stratum intermedium, and says: "Just what their significance is I am unable to state positively. I am led to believe that they supply the places made by the increase in the circumference of the enamel, and account for the short prisms seen in ground sections of the enamel. Their office is to develop ameloblasts to supply the places of those which are carried up with the growing tooth." To him the enamel is simply a coat of mail supplied by nature to protect the dentine.

Kölliker believes that the process of calcification is one of secretion. The "Tomes processes" he considered as being fragments of the hardened secretion, which are still clinging to the parent cell. Schwann believed that the enamel-cell was constantly increasing at the end next the enamel, and that the new growth or younger part is calcified as soon as it is formed. E. Klein says that the enamel is formed by the enamel-cells in the same manner as the dentine from the odontoblasts,—that is, the distal extremity of the cells next the dentine, elongates, and this increment is directly converted into enamel.

I wish to repeat what I have already said before, that the continual sheet of tissue that can be raised from young developing enamel is not a membrane, and I think most of the more recent authorities agree with me. Charles Tomes gives us to understand that it is something produced solely by the destructive action of

acids ; but this I am quite sure will be found to be a mistake. Mr. Mummery has shown that this layer exists in teeth which have not been subjected to the use of acids. It is only that part of the enamel first formed that is not wholly calcified. The enamel-cells that have been properly prepared and not shrunken will be seen filled with minute globules, highly refractive, and supplied, when the enamel is first formed, from the meshes of the stellate reticulum rich in lime-salts at this time.

When the stellate reticulum is absorbed, as it is just after calcification commences, the lime is supplied by a rich capillary net-work in contact with the enamel-cells. The authorities who speak of granules of lime have described them as seen in the shrunken cells in the tissue as it is usually prepared. They are really globular, though minute. If, just as calcification commences, we place a few drops of dilute nitric acid on the slide near the edge of the cover glass, it will, by capillary attraction, run under, and these refractive granular bodies in the stellate reticulum will disappear as will those that are in the enamel-cells themselves. Large numbers of small bubbles will accumulate, and force themselves out from under the cover glass. This would seem a positive demonstration of the presence in the stellate reticulum and enamel-cells of carbonate of lime just previous to commencing calcification.

I am convinced that these minute, refractive bodies are calcospherites, that are taken in by the active enamel-cells, and excreted from them where, by coalescing they form larger globules, and these form the rods. You will pardon me here if I quote briefly from my former paper on this subject. In teasing off portions of active enamel-cells from enamel forming, I have found the surface of the dentine on which it is being formed covered with layers of globules that have been deposited there by the enamel-cells. These given out from the cell continually, form by coalescing larger globules and these become the enamel-rods. One rod is separated from another by what appears to be a protoplasmic substance. This substance in many of my sections projected out beyond the line of calcification and appeared as though it was a process or a fiber; of this I shall speak farther on.

Many of my sections of forming enamel were purposely cut extremely thin, that I might study a single thickness of the layer of the cells, and these specimens were not stained; therefore some of them do not show as clearly in the photo-micrographs as I could wish. Yet I think I shall be able to demonstrate the points of which I speak. Others of these photographs will illustrate it almost as a diagram. Some little time after finishing my former paper on

"Enamel, its Development and Calcification," I read it to Prof. E. L. Mark, of the Biological Department of Harvard University. He stated that I had found and demonstrated new points about the enamel that a German investigator had recently described; that both papers gave similar views. At my request he translated the paper from the German journal in which it was published. Its title was "On the First Processes of the Deposition of the Enamel," by Dr. Graf Spee. The description he gave of this process was so nearly like my own, that I read it with considerable surprise.

I did not know that any one had described the enamel-rod as being formed by minute globules coming through the cell. But he had seen these minute and highly refractive globules in the body of the cell, and says that when the tissue is properly prepared—and he lays great stress on this point—they are always to be found there at the time of the formation of the enamel. Their entire absence at earlier stages is an indication that these globules are an enamel substance. He gives to them the name "enamel-drops," and says he saw these "enamel-drops," when enamel is to be formed, appear only in the half of the enamel-cells which rests on the dentine; afterwards farther up in the cell, but not quite up to the region of its nucleus. Many of them were so small as to be scarcely measurable, and they are always spherical. Great numbers of them are collected at the periphery, and appear here either to be completely merged or fused together. The lower part of the cell contains the larger "enamel-drops," which merge without sharp boundaries into the substance of the enamel-rods. This then appears as a part of the enamel-cell, in which the originally isolated "enamel-drops" have run together into a continuous mass, and the growth of the enamel-rod once begun, appears to take place by the addition of new "enamel-drops." Dr. Spee's "enamel-drops" were really what I described as minute calco-spherites which, merging together, had formed larger globules, of a substance which I believe to be calco-globulin.

Perhaps the most important contribution to the literature of dental histology during the last decade is a paper entitled, "Some Points in the Structure and Development of Dentine," by J. Howard Mummery, M.R.C.S., L.D.S., of London. This paper was read before the Royal Society, March 5, 1891. Appearances noted and demonstrated by Mr. Mummery in this paper recalled to my mind similar appearances which I had seen in the developing enamel, appearances that I could not then explain, that I did not understand. As some of his results will be of interest to us, while considering my subject I shall try and give a brief idea of them. He noted the appearance of

connective-tissue fibers or bundles of fibers in advance of the main line of calcification, whose high refractive index suggested their partial calcification, these processes being continuous from the formed dentine to the general connective tissue of the pulp. He found in a young developing tooth a distinct reticulum of fine fibers passing between and enveloping the odontoblasts. By a careful focusing, he saw these fibers gathered into bundles and incorporated with the matrix-substance of the dentine, out of which they seemed to spring. The origin of these fibers would seem to be from connective-tissue cells which are found everywhere in the pulp next the odontoblastic layer, and also, as he demonstrates, between the odontoblasts themselves.

He continues: "We can no longer look upon the matrix of dentine as being a homogeneous substance, but must regard it as composed of a net-work of fine fibers of connective-tissue, modified by calcification, and where that process is complete, entirely hidden by densely deposited lime-salts." His investigation as to the occurrence of this tissue suggests this view that these fibers are the scaffolding on which the tooth-matrix is built up; that they are incorporated in the matrix of the dentine, and form really the basis of its substance. Mr. Mummery's article is convincing and admirably demonstrated. His investigation was carried on after the process of Dr. L. A. Weil, of Munich, which consists of first fixing the soft parts of developing tooth in a saturated solution of corrosive sublimate in water. When fixed, the sublimate is removed by washing, and the specimen pressed through successive strengths of alcohol to absolute alcohol; then into chloroform, to which are gradually added fragments of desiccated Canada balsam, until a very thick solution of the balsam is produced. It is then allowed to penetrate and become hardened by keeping in a warm temperature. After the balsam is hard the specimen is removed, cut with a fine, sharp saw under water, as there has been no decalcification, and the sections thus cut are ground down first on a lathe with corundum and afterwards on a fine stone with water under the finger. Sections are then mounted in Canada balsam.

I have tried this process without any success on the developing enamel. The tissue at this time is too delicate to stand this treatment, and results in my hands have been failures—perhaps from a want of more practice in this method. But I do not believe it can be used with success when the tissues are so delicate. Certainly here the investigation of enamel is more difficult than that of dentine. The method is admirable for investigating fully formed structures, as it shows the organic tissues in undisturbed relation to

the calcified tissues. Appearances of calcified fibers projecting beyond the line of calcification I had already seen in young forming enamel, and I commenced a series of investigations to see if I could find out what these appearances indicated.

I commenced by trying to tease apart enamel-cells; after some little experimenting I am quite sure I found evidence that processes from the cells of the stratum intermedium of the enamel-organ pass down through and among the ameloblasts to the forming enamel beneath. And I judge that these are the processes which Mr. Tomes saw and described as processes connecting the enamel-cells with the cells of the stratum intermedium. I then commenced a series of experiments, trying to separate slightly the layer of enamel-cells from the stratum intermedium. The parted edges had the appearances of broken processes, and in several specimens there are processes crossing from the enamel-cells to the stratum intermedium. I shall try to demonstrate this appearance to you, although I confess I have a difficult task; the teased and pressed tissue and the different depths of the tissue make the matter a difficult one. I think I shall be able to indicate what I mean by my photo-micrographs.

A longitudinal section of a human tooth at birth, just after the process of calcification in the enamel has commenced, will show, between the enamel-cells and the formed enamel, a thin layer which has been called by earlier investigators the *membrana performativa*. It was misunderstood then; it is not a membrane. It is the latest deposition of enamel from the enamel-cells, composed of globules or masses of calco-globulin; and around these globules there seems to be a fibrous net-work. Connecting with this fibrous net-work and running to the formed enamel beneath, we find innumerable thread-like processes, appearing like fibers.

In several of my specimens this shows with great distinctness. There are indications of fibers which have been broken on the upper portion of this thin layer which appear as though they had been broken off, in the separation of the layer from the enamel-cells. In a longitudinal section of the tooth of a calf at birth, where the recently formed layer of enamel is still in contact with the fully calcified enamel, I have succeeded in teasing off this younger portion and exposing to view what appear to be fibrils standing out from the surface. These have apparently been drawn out from the only partially calcified new tissue.

In another longitudinal section from calf at birth are to be seen, on that part of the enamel broken away from the enamel-cells, processes standing out like so many coarse threads. They appear so

large that it is probable they have been enlarged either by the action of reagents, or by calcific matter clinging to a fiber, if one is there; and they are undoubtedly partially calcified. They are very much coarser than the fine fibrils which I saw between the enamel-cells. Deeper within, these processes are seen to surround the globules or masses, which have been deposited by the enamel-cells, and which are forming the rods.

In another section from tooth of calf, the younger layer of forming enamel shows a net-work of fibers, of which I have already spoken. They are surrounding the recent deposition of globules. It is only in this layer that I have been able to demonstrate this appearance. I have not been able to see this net-work in more fully formed enamel, but a distinct net-work is always visible in that layer first deposited.

In regard to the processes of the cell, Tomes first describes them, and says they are due to the manner in which the cell calcifies. In his illustrations they are shown as coming from the base of the cell, from the center and from the extreme edge. Sudduth believes that they have nothing whatever to do with the cell, as being mechanically made. He pictures them as coming from the base of the cell, from both sides of it and from between the cells.

Williams, as I have already quoted, states "As the formation of enamel progresses, these (enamel) cells recede, leaving within the formed enamel what appears to be a fiber of living matter." We have here, you see, a variety of opinions from excellent observers. My investigations lead me to believe that these processes may have their origin among the cells of the stratum intermedium; that they pass either within or between the enamel-cells, and thus on, to form a fibrous sub-structure, among which are deposited the globules which are to form the future enamel-rods.

When the calcification of the rod is complete, the lime-salts have been so densely deposited as to entirely obscure the appearance of any fiber. The stratum intermedium, in which, as I have stated, I have reason to believe these processes originate, has been thought by more than one observer to be a species of connective tissue. Of this fact I am not certain. But it is certain that, after calcification commences, the connective tissue of the jaw is in direct contact with the cells of the stratum intermedium, and the cells from this stratum must be and are recruited from the connective tissue of the parts.

Tomes, who has done much in describing human and comparative dental anatomy, has shown us that fibrils exist in the enamel of the kangaroo and in the Sargus, or sheep's-head fish. In this fish

the enamel is penetrated by a system of what he describes as tubes, which are not continued out of, or derived from, the dentine, but belong to the enamel itself. They give off numerous branches. This peculiar appearance led Kölliker to believe it was not true enamel, but Tomes proves that, being developed from an enamel-organ homologous with and exactly like that of amphibia and reptiles, the tissue must certainly be regarded as unquestionably enamel. To sum up my conclusions: I am led to believe that there probably exists in developing enamel, as has already been found in developing bone and dentine, a fibrous sub-structure on and between which the enamel is deposited. After the enamel is wholly formed, its existence seems to be wholly blotted out in the dense calcification of the tissue. In sections of wholly formed enamel, I have never been able to trace it, although I have tried the methods of those who claim to have seen it. In regard to a beaded protoplasmic reticulum of living matter in formed enamel, I have never been able to find it. I believe with Klein, that it is improbable that nucleated protoplasmic masses are contained in the interstitial substance of the enamel of a fully-formed tooth. I wish, in closing, to acknowledge my indebtedness to Prof. George A. Bates, of the Boston Dental School, for the use of specimens of sections of human teeth at the time of birth, which he had prepared, and from which several of my best photo-micrographs have been made.

There being no discussion, it was followed by a lecture by Dr. W. Xavier Sudduth, Minneapolis, Minn., also illustrated by lantern slides, of which a synopsis is given below:

ON SOME OF THE FORCES THAT INFLUENCE THE FORM OF THE JAWS AND TEETH DURING THE PROCESS OF DEVELOPMENT.

In discussing the subject of the evolution of the teeth it is essential that there shall, at the outset, be a full understanding between speaker and audience regarding the relationship of tooth to jaw, as the environment of the tooth has much to do in its formation.

A tooth in its early stages of development is wholly composed of soft tissues, and lies in a bed of embryonal connective tissue, constituting the foetal jaws.

This easily compressible matrix is bounded on the outer side by the cheeks and lips, which tend to compress it (the jaw) and hold it firmly against the tongue. The shape of the foetal jaw depends to a very great extent upon the form of the tongue, a pointed tongue giving a pointed arch, while a blunt tongue will give a correspondingly shaped one. From this it will be seen that even before there

is any osseous development the form of the arch is to a great extent determined by the environment of the jaws.

For a full understanding of the phenomena presented during the evolution of the jaws and teeth, it is necessary to consider the different organs that serve to produce the several parts of the tooth, viz: the papilla, the enamel-organ and the follicular wall. The papilla, or connective-tissue organ, gives rise to the dentine, the enamel organ to the enamel, and the follicular wall to the cement. It also forms the pericementum which attaches the tooth in its socket or alveolus.

Before the tooth assumes definite form ossification of the maxillæ begins, and each germ is separated into its own alveolus, so that even as early as the third month of gestation the type of the jaws is established. The development of bone in the jaws proceeds in the substance of the soft, connective-tissue matrix in such manner as not to disturb the form of the arch established in the first month of gestation.

The next step in the formative process is seen in the papilla, which now assumes more or less definite shape, according to the tooth it is to form, conical for incisors and cusped for molars.

The alveolar border gradually rises up around the growing follicle in such a way as almost to envelop it, but not entirely, as the enamel-organ is still connected with oral mucous membrane by its cord. About this time the first layer of dentine is produced as an investing cap for the papilla. It will thus be seen that the papilla determines the form and number of cusps to be possessed by each individual tooth; upon this thin layer of dentine the enamel is deposited, and by its outward development gives the rounded contour to the crown. These tissues are permanent and not transitory in character; the first formed layers of dentine constitute the extreme apex of the dentine. This now brings the study of the evolution of the teeth up to birth, at which time the process of ossification in the inferior maxilla has reached such a stage that a surrounding bony wall has been formed. If we were now to divest it of its soft tissues we would find the teeth occupying bony crypts upon its upper surface, much as peas are found in a pod.

The form of the jaw varies in different cases, but has the general shape of a parabolic curve, the outer rim describing a considerably larger arc of a circle than the inner because of the width of the jaw. On either side of the median line in each maxilla are located the crowns of five deciduous teeth. As these were first prefigured in soft tissues and shaped in the matrix of the jaws, they will be found to be slightly flattened on the inside of the arch,

because of the greater resistance offered by the tongue, while the outer side will be considerably contoured. This is in accordance with the well-known nature of protoplasm, which always shows a marked tendency to assume the globular form when possible. The proximal surfaces are flattened by the pressure of adjoining teeth. Their outer surfaces are broader than their inner because of the greater length of the outer circumference of the arch. The incisors of the deciduous set are wedge-shaped, but less markedly so than those of the permanent set, a point to be explained later on. The molars are bluntly cusped.

The next stage in the process of development is eruption and concomitant formation of the roots around which the temporary process forms, closely hugging the roots.

The anterior permanent teeth arise from buds that are given off from the inner side of the enamel-organs of the temporary teeth and from the mucous membrane of the mouth for the molars. The anterior germs occupy crypts on the lingual aspect of the temporary set.

The bicuspidis locate immediately beneath the temporary molars. The roots of the deciduous set have much to do with giving form to the crowns of the permanent set, especially the temporary molars, which serve as matrices. The cusps of all molars are the result of compression of the rounded papilla, which becomes depressed at its greatest convexity. The larger the bulb, the greater the opportunity for the formation of sulci and fissures.

Anything that interferes with the normal process of development will necessarily leave its impress on the crown in the shape of malformations. This is so well known that it need not be discussed in this connection. Suffice it to say that congenital syphilis, rachitis, scrofula, all the exanthemata and pathological processes, in connection with the absorption of the roots of the temporary teeth, are among the several factors that pathologically influence the form of the crowns of the teeth. Faulty nutrition, from whatsoever cause, results in poorly calcified and malformed teeth in a great variety of forms.

There yet remains to be considered the effect of use and disuse, and the indirect influence of environment.

As we have seen, the teeth are fully formed, so far as their crowns are concerned, before they erupt, consequently these are exempt from the influence of "use" and "disuse" in the formative stage.

A human tooth once fully formed and erupted is subject only to two changes in form. This is by mechanical abrasion and chemical

disintegration, and as these are not inherited, they have little interest to us in this connection.

As many teeth are "continuous" growers, persistent and special use by producing a condition of hypernutrition causes an increased development of their roots. Such teeth develop into tusks and are devoid of enamel, the cement forming the outer covering. In this class we have the tusks of the elephant, hippopotamus, wild boar, and such animals.

Certain changes may and do occur in the form of the teeth as the result of the action of the law of "variation," whereby additional cusps are formed and other such similar changes which are subject to inheritance. These changes, as long as they do not interfere with the normal function of the organs, are not detrimental; within certain bounds variation is beneficial. It is this tendency of nature that makes the development of the species possible, and enables nature through the law of the "survival of the fittest" to perpetuate species under adverse environment.

Yet another condition, that of change in form of the jaws as the result of artificial selection in animals under domestication, exists, where the position of the teeth in the jaw as well as marked change in form and even suppression in the number of teeth may result.

Several cases of this latter defect have come under my notice, the most marked being the common swine and pug dog. Here the fad is for short faces, and as a result the teeth are crowded in the arch or suppressed in eruption.

Not only does this law apply to the brute creation, but the love of the beautiful, as expressed in the selection of even-featured, hence small-jawed, partners for life among men in the more prosperous classes tends to cross a large-toothed male upon a small-jawed female, with the result of crowding the arch.

The discussion of this subject might be indefinitely continued, but I think that I have said sufficient to awaken interest and arouse discussion.

[At the conclusion of Dr. Sudduth's address he showed slides demonstrating the influence of selection upon the form of the bones of the head and upon the teeth of the hog. The first of these exhibited the hog which took the highest prize in the first agricultural exhibit ever held in England, in 1767. The snout and teeth of the animal had the general characteristic of the wild boar, though somewhat modified even then by selection in breeding. The second picture was of the hog, of the same breed, which took the prize at

the Centennial Exposition in 1876, and showed an entirely different shape of head and snout. The last picture of the series was of the skull of the latter animal, from which it was seen that not only were the head and teeth modified in shape, but that the last molars had not erupted at all, showing the effect of disuse upon these organs. In closing Dr. Sudduth said that Dr. M. H. Cryer would say something about the effect of breeding upon the pug dog, in which the variation was as great as in the hog.

Dr. Cryer said that the effect of selective breeding on the teeth of the pug dog was such that the teeth were exceedingly irregular, the lower jaw protruding beyond the upper, producing the condition known as "underhung." Their anterior teeth are soon lost for lack of use through non-occlusion, and the posterior molars often are not erupted, and upon dissection of the jaws are found in a rudimentary condition. All this is the effect of selective breeding, with the efforts directed specially to the shortening of the face.]

Adjourned.

At the Thursday evening session, Dr. D. E. Caush, of Brighton, Eng., read the following paper:

SOME CHANGES THAT TAKE PLACE IN AND AROUND THE PULP-CANAL.

During the microscopic examinations of exostosed human teeth, my attention was continuously drawn to certain alterations in the shape and structure of the pulp-canals; it was an unusual thing to find in an exostosed tooth a perfect pulp-canal, and this led me to the examination of a large number of these teeth. The subject has been under observation about five years, and the deductions drawn are from the examination of between two and three thousand teeth. We were led to the furtherance of this study, on observing certain irregularities of outline in the pulp-canals of the teeth. In some cases we noticed here and there slight excavations at certain points of the canal, and from that stage we were enabled to obtain microscopic slides illustrating the various stages of these changes, until the whole of the original outline of the pulp-canals had disappeared, leaving in its place a very irregular canal. The canal was also much enlarged, and it was observed that frequently in different directions the contour of the canal varied much, as the excavations may extend over a very small portion of the canal or they may continue in any given direction until a second canal is formed, frequently passing at right or acute angles to the original canal, continuing until it has passed through the dentine into the cemental tissue. These canals may be either simple or branched, or instead of canals passing thus

at angles to the pulp-canal, the two or three canals of an inferior or superior molar may be united together into one large irregular canal.

In all cases where this change has taken place the margins of the canals show a more or less irregular edge, produced by the semilunar excavations of the dentine.

The definite termination of the dentine, as seen in the pulp-canal of an ordinary tooth, has given place to the indefinite, and irregular margins are produced.

These semilunar excavations vary much in size, as well as in number, varying from a single slight dip or depression as found in the earlier stage to the numerous excavations producing the complex and irregular outline as seen in the advanced stage.

If, as is often the case, these teeth remain in position after these excavations have been produced, a second change more marked even than that of the excavation oftentimes follows, for in these depressions it is not at all unusual to have a deposition of new bony tissue, entirely different in microscopic structure from the dentine which surrounds it. In this new tissue we have no tubuli radiating to a given center, as in the ordinary dentine, but in place of the tubuli we have a number of *lacunæ* and *canaliculi*, in character somewhat like those found in true cemental tissue. This tissue does not appear to be true bone, as it is very unusual to find any true Haversian system, even where there is comparatively a large amount of the new tissue deposited. The *lacunæ* as seen in this tissue are irregularly placed, as in the thickened cemental tissue, and vary much in number and position. They may be very closely packed with short *canaliculi*, or they may be scattered throughout the substance of the tissue, and have *canaliculi* of some length joining two or more of the *lacunæ* together.

As to how these changes are brought about is a subject of great interest, and we do well to carefully consider it.

The irregular margin and semilunar character of the edges give us a clue, and show at once that there must have been absorption going on in a greater or lesser degree, according to the amount of change that has taken place. This absorption may have commenced at different points of foci along the margin, and gone on spreading till the whole of the margin is acted upon, or it may commence all along the edge of the canal at the same time.

It is evident (microscopically) that such an edge could not be produced by the addition of new tissue alone, as in cases where secondary dentine is deposited either as dentine of repair (in those cases where caries has almost penetrated to the pulp-canal, or as a

result of repair following accidental penetration of the pulp-canal during the operation of preparing a cavity for filling), or as a result of pulp-calcification, for in either of the enumerated cases the microscopic structure of the tissue is quite different; in all these cases the new tissue is always added *directly* to the older tissue without any excavations or absorptions of the original margin, and the secondary dentine is deposited directly from the odontoblastic layer of the pulp. It would appear then that these excavations, and this new tissue, cemental in character, could not be produced directly from the odontoblastic layer of the pulp in health, for we have seen under such circumstances, should there be any deposit, it would take the form of secondary dentine or pulp-calcification.

To understand the changes that have taken place in the teeth we must consider three things:

1. The change that takes place in the odontoblastic layer.
2. How the excavations along the margin of the original tissues are produced; and
3. The manner in which the new tissue is deposited.

It may help us to understand these changes if we devote a short time to the careful examination of the exterior surface of an exostosed tooth. We will take for our examination a tooth where there has been acute inflammation of the membrane, and then a time of rest. On examining such teeth, the first thing to which our attention will be drawn is the thickened condition of the membrane, and it may appear two or three times as thick as it would appear in health, and at certain places under the membrane we may frequently find excavations going on and giant-cells in position; again, in another place in this root we may find some older excavations, and a layer of new tissue filling up the excavations and increasing the size of the exostosed tooth by the additional tissue formed; in fact, the three stages of the development of cemental tissue in exostosis.

Keeping these changes before us, we will endeavor to follow up the history of the changes that take place in the pulp-canal.

The first change we have to consider is that which takes place in the layer of odontoblasts, or lining cells of the pulp-canal. These cells are the points of attachment, too, and the source of nourishment from the pulp to the dentine, the connecting link between the hard calcified dentine and the soft vascular tissue and nerve-matter that forms the pulp; it is from this layer that the secondary dentine is formed, but under certain circumstances the character of the cells forming this layer changes, both in shape and size. Thus if by such cause as congestion, or slight inflammation of the pulp, a greater amount of blood is brought the blood-vessels in the pulp,

these cells appear to lose their original shape, and (instead of being elongated with processes penetrating into or passing between the tubuli) swell up, the nuclei becoming active, and new cells are rapidly formed by cell-division. As these new cells continue to form, a layer like the alveolar dental membrane in appearance is produced, and this newly formed layer presses upon the dentine. The cells in juxtaposition with the dentine begin to absorb the latter, and thus obtain more room for further development. This goes on as long as there is an abnormal blood-supply to the pulp, and thus owing to either a long or short time of pressure upon the dentine, caused by the excess of formative material brought to the cells by the increased blood-supply, we may have many or few excavations produced, as in the case of chronic inflammation of the pulp we get many excavations, and oftentimes these excavations penetrate more deeply into the original tissue. Or should there be any imperfectly calcified tissue surrounding the pulp-canal, at that point the giant-cells will penetrate more easily and the excavations will increase in that direction, and in some cases produce canals that pass out of the pulp-canal at various angles. These excavations may grow continuously, or there may be times of quiescence as well as times of activity, while these terms of activity or rest may correspond with similar changes on the external surface of the tooth and produce layers of cemental tissue. Should the tooth be extracted about this period, nothing but the excavations or the thickened membrane will appear in the pulp-canal.

These changes, as we have seen, are produced by the changes that have taken place in the odontoblastic layer of the pulp-canal. If the tooth is not extracted, the whole of the pulp becomes more or less congested and altered in character; the odontoblastic layer being destroyed, there is little or no inter-communication with the dentine by the tubuli, and at this stage one of two things may occur:

1. The blood-supply becomes normal, the congestion temporarily passes away, and for a short time the tooth is tender to the touch as if there had been periostitis, and from this stage it gradually becomes comfortable, and remains so until the inflammation again commences, or—

2. The giant-cells change their character, and become formative cells, producing as a result of calcification a fresh tissue in the canal containing a number of lacunæ with their canaliculi. In this tissue thus we have a new tissue formed in the enlarged pulp, in character and in microscopic structure resembling cementum, developed also from a membrane similar in character to the alveolar-dental membrane; and on considering the close relationship during development of the two

tissues (dentine and cementum), it does not appear to be at all difficult to follow the various stages that take place in the production of this new tissue. These changes are not confined to the human subject. I have found the various stages in the incisors of the horse, though the molars are all free from any of the various changes. I have also found the incisors of the horse exostosed, as well as the enlargement of the pulp-canal and the new tissue deposited in the excavations.

DISCUSSION.

DR. A. O. HUNT, Iowa City, Ia. I have had the idea for some time, that all deposition within the body of the pulp would be of a character like cementum, rather than dentine, for the reason that the blood-supply for sustaining it comes directly from the dental membrane. One slide spoken of, where the channel runs out at angles with the pulp-canal, and states that this is accomplished by the infiltration produced by the formation of the new cell-tissue by pressure upon the dentine. I think perhaps he has not seen a condition that often exists in the human teeth, *i.e.*, more than one foramen, one pulp-canal, in a tooth, when we ordinarily have but one, and the appearance of the slide as thrown upon the screen indicated to me that that was probably the condition of the case where the channel was thrown out at right angles to the main pulp-canal. Sometimes there are more of these on the same tooth, and we usually say it is typical of the human teeth to have but one pulp-canal, but that is not always the rule. I apprehend that in this specimen, the formation of the lime-deposit was thrown into the canal, and this is a physiological condition and not a pathological one.

DR. G. V. BLACK, Jacksonville, Ill. I feel like thanking you gentlemen for sending us these beautiful slides. The slides in themselves are educational. I like to see these things thrown upon the screen, for, in the very nature of things, not many of us can see them by the aid of the microscope. But I have a word to say in regard to the ideas inculcated in the paper. It has fallen to my lot to cut a great many of these sections, and to study them and to write upon them, to some extent. Now, there are a number of different calcifications, if I may use that term, occurring in the pulp-chamber. We have the simple dentine, as shown; then, again, occasionally the true dental tumor, growing out of the wall into the pulp-chamber, presenting the canaliculi. The thing we find the most of, and the thing that seems to have been shown mostly upon the screen, is calcification that has occurred as degeneration, which is undoubtedly, to my mind, simple degenerate calcification, such as we have in the arteries, and around the valves of the heart, and

other parts of the body. These occur very frequently in the pulp-chamber, when, from any cause, either from age or from disease, or abrasion of the teeth, calcification of these organs occurs. This may be attached to the pulp-chamber, as we have seen upon the screen, or may be free within the pulp in various forms; they are not properly tissues, they are simply calcification of the tissue in a state of degeneration.

Now, as to absorption, some of those long lines running through the dentine, that we have seen on the screen, I am in the habit of determining as blood-vessels included in the dentine. We find these canals shooting out in different directions from the pulp-chamber, and they certainly are the things I have been in the habit of interpreting as forming the vessels in these lateral canals. It is exceedingly rare. We have them abnormally large, and filling up with calcific matter. We may occasionally have them filling up by cementum, and that is rather rare; but the true cementum, having the true characteristics, is a very rare thing indeed.

We find them often in the elephant and walrus, but not often in the human. There is one point I should have mentioned. A cavity occurred in the dentine upon one of the slides. Now, it is often the case that we have absorption penetrating deeply into the dentine from the dentinal membrane, and it is easy to cut off one of these portions, such as is shown here. These cavities are often filled up with cemental tissues afterward.

Dr. Geo. Cunningham, of Cambridge, England, read a paper of which we give a brief abstract, entitled:

LUXATION, OR THE IMMEDIATE METHOD, IN THE TREATMENT OF IRREGULAR TEETH.

The paper was a description of a number of cases of the method of treating irregularities by luxation, which had been practiced by a number of English dentists. Though a number of teeth so treated had been lost by putrefaction of the pulp and abscess, or by necrosis and absorption, there is ample evidence that the operation has been completely successful in a sufficient number of cases to warrant the continuance of the practice under proper circumstances. It is evident that an important factor in this treatment is, the stage of root formation; though just what this bearing is, has not yet been sufficiently determined. When the slow mechanical means are out of the question, this method may be regarded as filling a niche not previously occupied by any other operative means at our disposal.

The paper was illustrated by a large number of slides, showing various cases related.

DISCUSSION.

DR. BARTON. I would ask if the root of the tooth is moved as well as the body of it.

DR. CUNNINGHAM. I hope it is, and the point I endeavor to carry out is to move the tooth entirely, and look for the repair in the bone.

DR. CRAWFORD. Is the pulp capable of being stretched to any extent?

DR. CUNNINGHAM. In my opinion, no.

DR. JARVIE. I would like to ask, how much force is required to move one of these teeth into new position? as much as would be required to extract that tooth, or less?

DR. CUNNINGHAM. In most instances, a great deal more.

DR. JARVIE. This subject of immediate treatment of irregularities is a most interesting one to me. Dr. Cunningham's experience has extended over eight years, and I would ask him whether he would advise this method of regulating teeth in a majority of cases, or whether only in a few cases, and in the majority of cases recommend the ordinary slow method of regulating? He has shown some marvelous results, in which he has moved teeth a quarter of an inch, with the pulps kept alive, and, barring the pain of the operation at the moment, no results that are severe to the patient. Now, if irregularity exists, and the teeth can be made regular by a method that will involve only a few minutes' pain, it is infinitely better than one that extends over several weeks or months.

DR. CUNNINGHAM. There is one point that I have not sufficiently brought out, the question of pain, which is a large factor in determining an answer to such a question. In the first case, where I move so many teeth, I performed the operation under an anesthetic, and in the last cases, without any anesthetic whatever. In regard to the comparative merits of the slow and the quick methods, I do not consider that I am in a position yet to give a definite opinion. It has been a long time since the first operation, as you will observe, and this the first time I have brought it before a body of this kind. I have a certain amount of diffidence in bringing forward so simple and easy a way for both the patient and operator. I am not in a position to say that such an operation replaces the older method. I only claim that in these operations I have taken them where the ordinary operations have failed. The slower method is the surer, and at the same time there is an element of hope in this operation which is very great indeed. You will notice the operations have been performed on the upper jaw. An eminent surgeon said to me that he was surprised I did not begin on the lower jaw. He said he thought

I would get better results with the lower jaw. I am ready to try a case on the lower jaw, as soon as one presents itself. Is that an answer to the question, Dr. Jarvie?

DR. JARVIE. It is an answer, and yet it is not. The question of regulating teeth is a very interesting one. I am continually doing it, and I take a great deal of interest in every case I do, and in the process by which I accomplish it, and from time to time cases present themselves in which I wish I could do what Dr. Cunningham has done so successfully, but I have every time dreaded to attempt it.

DR. CUNNINGHAM. I am ready to do the operation at any time, without any dread, when the patient has arrived at adult age.

THE BANQUET.

The banquet was held Aug. 18, at the Chicago Beach Hotel, the rooms of which were beautifully decorated for the occasion. Dr. James A. Swasey presided, and two hundred and forty-two guests sat down, including nearly every foreign representative in attendance at the Congress. In the responses, which were of a highly congratulatory character, twenty-seven countries and nations were represented, as follows: Australia, Brazil, Paraguay, Uruguay, United States of Colombia, Chile, Cuba, Mexico, Philippine Islands, China, Japan, Hawaii, Denmark, Italy, Russia, Greece, Turkey in Europe, Spain, Austria-Hungary, Switzerland, Germany, France, Great Britain, and the three provinces of Canada, British Columbia, Ontario, and Quebec.

A LUNCH TO THE FOREIGN REPRESENTATIVES.

On Saturday afternoon President Shepard gave a lunch to the one hundred and nineteen representatives of foreign lands in attendance upon the World's Columbian Dental Congress, at the Wellington Cafe, within the World's Fair grounds. A delightful time was had, speeches of felicitation and greeting were exchanged, and those present thoroughly enjoyed this particular feature of the social side of the Congress that called them from labor to refreshment.

THE WOMAN'S DENTAL ASSOCIATION OF THE UNITED STATES.

The meeting of the Woman's Dental Association of the United States was held in the Memorial Art Palace, Friday, Aug. 18, 1893, commencing at 10.30 A.M. Between thirty-five and forty women dentists were present.

In the absence of the president, Dr. Mary H. Stilwell, the meeting was called to order by Dr. Emma L. Benham, and on motion Dr. Elizabeth Davis, Philadelphia, chairman of the Executive Committee, was called upon to preside.

The secretary, Dr. Eliza Yerkes, read a letter from the president, expressing her regret at her unavoidable absence. The president spoke of the apathy of women practitioners toward any concerted efforts for their own advancement, but the work of forming an association of women dentists had been accomplished, and the movement would doubtless prove of the greatest advantage to all women practitioners.

The corresponding secretary, Dr. Anna T. Focht, Philadelphia, in her annual report, laid great stress on the fact that great indifference had been exhibited in the matter of replies to letters and circulars sent out from her office.

A brief review of the history of the National Association was given by the recording secretary. The first meeting looking toward such an organization was held March 19, 1892, and a charter was obtained in July, 1892. At the present date there is a membership of thirty-three registered women dentists, with six applications under consideration.

The treasurer's report for the year showed a small balance on hand.

The roll of States represented in the Association was then called for, with reports from the several vice-presidents.

The vice-president from the State of Illinois reported that there are in the State five colleges recognized by the National Association of Dental Examiners as *reputable*. Unfortunately two of these refuse to admit women as students. There are eight registered women practitioners in Chicago, one in Springfield and probably others in the State. Woman's work in dentistry is recognized as creditable and satisfactory.

The officials of the World's Columbian Dental Congress have shown the most favorable disposition toward woman dentists, but the women themselves have been slow to respond. Woman physicians and women dentists work harmoniously together, especially since the more general recognition of the reflex of the fifth nerve. Dentistry is recognized as a specialty of medicine, and women dentists must make every effort to rise proportionately. I hope then that our women will come forward and take hold of society work, the surest method of self-elevation.

The vice-president from Massachusetts said she only knew of five women practitioners in her State. The Boston Dental College ad-

mits women students on an equality with men. Harvard does not yet admit us, but as one of their professors said to me, you are knocking at the door so loudly that we have got to do it.

The representative from Maryland said that she occupied the forlorn position of being the only woman practitioner in that State. Women were not admitted to the colleges nor to the societies, except on one occasion she had been offered a position on a committee requiring the payment of a fee.

The vice-president from Washington, D. C., sent the sad message that she was writing from the bedside of a dying father, and could furnish no report.

The representative from Rhode Island said that she also claimed fellowship with Massachusetts, as she was a graduate of the Boston Dental College. She was a member of the State Society and had never met with any professional opposition in either State.

The representative from Wisconsin stated that six or seven ladies were practicing dentistry in that State, and they seemed to be gladly welcomed by the people.

The corresponding secretary now read a most interesting letter from Prof. Jas. Truman, relating the struggles marking the admission of women into the dental colleges. At the conclusion of the reading, on motion of Dr. Hirschfeld, the first woman graduate in dentistry, a rising vote of thanks was tendered Dr. Truman in recognition of his services in the cause of woman in dentistry.

Dr. Truman responded with great feeling to this mark of appreciation.

The chairman of the Association hoped that some action would be taken to give the letter of Dr. Truman greater publicity than would be secured by its publication in the annual transactions of the Association, which would reach only the members of the Society, and a committee was therefore appointed to see that proper publicity be secured.

Dr. Benham thought that as a history of women in dentistry it should have a place in the transactions of the Congress beside that of Dr. Shepard giving the history of what man has done in dentistry. The photographs of Dr. Truman and Dr. Taft were also desired for a place in the transactions of the society. It was stated that the Baltimore College of Dental Surgery had graduated eight or ten women while Prof. Gorgas was Dean of that institution.

The question was asked as to the number of women graduates in dentistry. The reply was made that the present location of about one hundred and fifty was known, though there were more than that number, as many had made no response to letters which,

however, had not been returned to the writer. The colleges know how many they have graduated, but they cannot keep track of their locations.

Certificates were read showing that Mrs. E. R. Jones had, prior to 1859, assisted her husband in his dental practice, and had continued it after his death.

The recognition of the society was given to the labors of Dr. Hattie E. Lawrence in forwarding the interests of the present meeting.

The representatives from Colorado, Missouri, Montana, and Nebraska presented their respective individual reports, and Mrs. J. M. Walker spoke for the women of the far South.

A message of greeting to the absent president was voted, and the association then adjourned.

WHILE not in any sense an integral part of the World's Columbian Dental Congress, the meeting of the Woman's Dental Association of the United States was an important factor in developing the feeling of harmony and unity of interest which more than anything else has characterized the Congress. The efforts of the organizers of the first association of women practitioners of dentistry in the world were impeded by lack of interest and more or less apathy upon the part of those for whose benefit the work was mainly undertaken. Misunderstandings and narrow-minded prejudice contributed their full quota of obstacles to a successful result, just as they did in the case of the Congress, but happily without avail, and the result has been most successful.

That the World's Columbian Dental Congress has been a success, needs no other proof than the record which it has made. Whether it be estimated in point of numbers in attendance, character of the literary, scientific, clinical, historical, or practical exhibits, the verdict must still be that it has been the most successful meeting of dentists ever held in the world's history. The one result, however, that stands out and overtops all others in importance is the harmony of feeling and fellowship which has been developed among all present, and which in one short week has done more to wipe out the evidences of professional jealousy, both local and international, than could have been done in years by any other means. It has also demonstrated the interesting fact, in spite of intense and bitter opposition from many sources, that after all a congress of dentists, by and for dentists, is the kind of a dental meeting which meets with the greatest favor by the dental profession, and achieves the greatest and most lasting success.

AMERICAN DENTAL ASSOCIATION.

The American Dental Association held its thirty-third annual session in Kindergarten Hall, Chicago, on Saturday, August 12, 1893.

The meeting was called to order at 10.30 A.M. President J. D. Patterson in the chair.

Dr. J. N. Crouse, from the Executive Committee, explained that the change in the date of the World's Columbian Dental Congress, had necessitated a change in the date of the meeting of this association, and the committee had unanimously agreed upon the 12th of August.

Dr. A. L. Northrop, New York, offered the following, which was unanimously adopted:

Whereas, The date of our meeting, which was fixed for August 15, under the expectation that it would immediately precede the opening of the World's Columbian Dental Congress, has been changed because of the change in the date of holding the Congress; therefore

Resolved, That the unanimous action of the executive committee in calling the meeting in advance of the day selected is hereby approved and declared to be legal and binding.

The Executive Committee presented as their report, the following resolutions:

Whereas, It has been generally understood by the members that in order that more interest and work should be concentrated in the Congress, the meeting of the Association this year should be as nearly as possible of a merely formal character; therefore

Resolved, That the dues for the current year be remitted and the treasurer be instructed to give receipts in such form that a single payment shall cover the dues for the current and the coming year;

Resolved That the meeting this year be adjourned without any election of officers, as under the constitution the effect of such non-election will be to make all officers elected last year hold over;

Resolved, That all records and transactions of this year be considered as merged in the proceedings for 1894 and so published, in order that in spirit and in name the officers elected last year shall not be considered to have held office and exercised their functions for two sessions;

Resolved, That the treasurer be instructed to pay all properly authenticated bills;

Resolved, That Old Point Comfort be selected as the place of meeting for next year.

The resolutions were considered separately and adopted except that selecting the place of meeting, for which a substitute was passed providing for a nomination of places and a ballot.

The following places were put in nomination: Old Point Comfort, San Francisco, Niagara Falls, Saratoga Springs, and Look-out Mountain, and as the result of the balloting Old Point Comfort

was chosen. The Association then adjourned to meet at Old Point Comfort next year.

SOUTHERN DENTAL ASSOCIATION.

THE Southern Dental Association met Friday, Aug. 11, in Kindergarten Hall, Chicago; Dr. B. Holly Smith, president of the association, in the chair.

The meeting was called to order at 11 A.M.

On motion, the reading of the minutes of the last meeting was dispensed with.

The report of the Executive Committee being called for, the chairman said that under the unusual circumstances it was thought best by the Executive Committee that the association should adjourn till the next annual meeting, allowing the present officers and committees to hold over till then. He reported that the books of the secretary and treasurer had been examined and found correct, and suggested that no dues should be required of the members for this year.

Dr. Beach said that as the law of the association was that each member should pay three dollars a year dues, he did not think they could legally remit the dues for the year, but they could change the regulation requiring each member to pay his dues before he took any part in the meeting. He thought that it would be necessary for members to pay their dues during the year if they were to continue in good standing.

The president decided that if the vote to remit the dues was unanimous, it would be legal.

Dr. McKellops thereupon said that he thought the dues could and should be remitted this year, and made a motion to that effect, which was carried unanimously.

The Executive Committee reported that charges were brought against Dr. E. B. Marshall, of Rome, Ga., of unprofessional conduct in having advertised, and the secretary read the following advertisements:

I.

DR. MARSHALL'S ANCHOR PLATE

For artificial teeth is the most satisfactory denture known, spoken of in the highest terms by the most eminent dentists, worn with comfort without covering the roof of the mouth, no injury to adjoining teeth, remains immovable in masticating food, can be easily removed and replaced at will.

This denture is covered by letters-patent. [Made only in North Georgia by Dr. E. B. Marshall. Office, 302 Broad St., Rome, Ga.

11.

Rome has been distinguished among the dental profession by the invention of Dr. E. B. Marshall. The Anchor plates have been patented by the doctor, and patients are coming from a distance to get the benefit of it.

It is the best denture known, and held firmly in place without clasps, and can be removed and replaced at will. See ad.

On motion, Drs. Gordon White, N. A. Williams, and M. W. Foster were appointed a committee to correspond with Dr. Marshall in regard to this matter, with instructions to report at the next annual meeting.

The secretary presented bills for stationery, etc., which on motion were ordered paid.

Dr. Gordon White moved that the secretary and treasurer correct the list of members and prepare a new book. Carried.

On motion of Dr. McKellops, the officers were allowed to hold over till the next annual meeting.

Dr. Marshall moved that the selection of the place of the next annual meeting be left to the Executive Committee, and that the committee be instructed to report within six months. Carried.

On motion the association adjourned till the next annual meeting.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The tenth annual meeting of the National Association of Dental Faculties was held in Kindergarten Hall, Chicago, commencing Thursday, Aug. 10, 1893.

The Association was called to order at 11 o'clock A.M., President J. D. Patterson in the chair.

Twenty-two colleges were represented at the first roll-call.

The Ad Interim Committee reported a case in which a student, who had attended a full term at one college but had not presented himself for examination at the end of the term, and consequently received no certificate, applied for admission to the advanced grade in another college. Upon the right of the second school to examine such student, without certificate, the committee had ruled that the dean of the second school could exercise his judgment. This decision of the Ad Interim Committee was overruled by the association.

The Ad Interim Committee also reported in relation to a request made by the dean of the Ohio College of Dental Surgery, who desired to be informed "whether a student who regularly completed a course at a recognized college, whose six months' session ended in June, may enter the class of another recognized college the following Oc-

tober as a regular student." The committee had held that such second entry would not be in conformity with the rules of the association. A motion to sustain the committee's ruling was adopted by unanimous vote.

A resolution offered by Dr. Truman restricting to one delegate from each college the privilege of speaking, voting, or acting on committees was adopted.

The Executive Committee reported a recommendation that applications for membership must be indorsed by two or more members of the association. The recommendation was adopted. [Takes effect in 1894.]

The application of the Western Dental College of Kansas City, for membership, was again laid over for a year.

At the request of Dr. Carpenter, for a ruling upon the by-law in regard to dissections, the president ruled that the language was mandatory.

Under the call of colleges for reports, Dr. Gorgas, of the University of Maryland, Dental Department, stated that his school had under consideration the adoption of separate lectures for the three classes.

Dr. Morgan reported that Vanderbilt University, Dental Department, had abandoned the preliminary course in September, and instead would give the students a practical course at the end of the session, commencing about the middle of January, the regular term beginning the first of October.

Dr. Sudduth reported that the College of Dentistry, Department of Medicine, University of Minnesota, had adopted as a preliminary course a quiz for conditioned students. They had also changed the degree from "D.D.S." to "D.M.D."

Dr. Goddard, of the University of California, Dental Department, reported that his college had increased the requirements for entrance by adding Latin to the list of studies to be passed in examination. First-course students take also the elements of pharmacy. Each student performs a graded series of experiments in metallurgy, and for the seniors a practical course in orthodontia has been in operation for several years. The sessions commencing this fall, will begin the first Monday in September and continue nine months.

The Executive Committee reported applications for membership from the following schools, which under the rules lie over to next year: University of Buffalo, Dental Department; Western Reserve University, Dental Department, of Cleveland.

The resolution offered last year by Dr. Winder, with reference

to the admission of graduates in pharmacy to advanced standing, was taken up for action and on a vote was lost.

The resolution on the same subject offered by Dr. Peirce at the last session was then taken up, amended and adopted as follows:

Resolved, That colleges of this association may admit to the junior class graduates of recognized schools of pharmacy, subject to the examinations of the freshman year.

The amendment to Article VII. of the constitution offered last year was taken up, and on motion laid on the table.

The following resolution, laid over from last year, was adopted:

Resolved, That any college of this association failing to have a representative present for two consecutive years, without satisfactory explanation, shall be dropped from the roll of membership of the Association.

Dr. Sudduth moved that Latin and Physics be added to the list of subjects now required for entrance into the colleges belonging to the National Association of Dental Faculties, with the understanding that a student may take one condition, which must be made up before he will be allowed to take the junior examination. Under the rules this lies over.

The Executive Committee reported favorably upon the application of the Detroit College of Medicine, Dental Department, of Detroit, Mich., and the Homœopathic Hospital College, Dental Department, of Cleveland, O., recommending them for membership. The report was adopted as to the Detroit College, which was thereupon elected to membership. The recommendation with reference to the Homœopathic Hospital College was rejected, and the matter referred back to the committee for further investigation. The committee reported later adversely; the report was adopted and the application was rejected.

The Executive Committee also reported that Howard University, Dental Department, of Washington, D. C., had requested that its application lie over another year.

The Executive Committee reported adversely upon the United States Dental College, and the report was adopted unanimously.

Dr. Morgan offered the following, which lies over one year:

Resolved, That a certificate of attendance from a medical school, to be accepted as the equivalent of one course in dentistry, must show that the student attended at least seventy-five per cent. of a five months' term, and also passed a satisfactory examination in his freshman year.

Dr. Truman, chairman of the special committee appointed to investigate statements made by Dr. Sudduth in a paper before the Academy of Dental Science at Boston, reflecting upon the conduct of certain dental colleges, made a minority report, recommending that Dr. Sudduth be censured for the language used. By a vote of

10 to 12, the recommendation was rejected, most of those voting in the negative stating their belief in the want of jurisdiction by the association.

A communication from the Royal College of Dental Surgeons, Ontario, resigning its membership in the association, was presented by the Executive Committee, and on motion it was ordered that the resignation lie on the table until the next annual meeting, and that the college be requested to send a delegate to the meeting in 1894.

Dr. Hunt moved the repeal of the rule admitting undergraduates in medicine to the junior grade. Laid over.

Dr. Hunt moved that the rule upon the standing of graduates in medicine be amended to read as follows:

A diploma from a reputable medical college entitles the holder to enter the second or junior grade in colleges of this association, and he may be excused from attendance upon the lectures and examinations upon general anatomy, chemistry, physiology, materia medica, and therapeutics.

Laid over under the rule.

The Executive Committee reported the following resolution, which was adopted:

Resolved, That a committee be appointed to formulate a series of subjects and questions for preliminary examinations and a minimum standard to be reached before admitting students to colleges.

The election of officers resulted as follows: H. A. Smith, Cincinnati, president; C. L. Goddard, San Francisco, vice-president; J. E. Cravens, Indianapolis, secretary; Henry W. Morgan, Nashville, Tenn., treasurer; A. O. Hunt, Iowa City, Ia.; J. Taft, Cincinnati; Frank Abbott, New York, Executive Committee; James Truman, Philadelphia; Thos. Fillebrown, Boston; W. H. Eames, St. Louis, Ad Interim Committee.

The newly elected officers were installed, the retiring and incoming presidents each returning thanks briefly and gracefully.

The following committees were appointed:

Committee on Schools.—J. A. Follett (chairman), F. J. S. Gorgas, Louis Ottogy, C. N. Peirce and Truman W. Brophy.

Committee on Text Books.—S. H. Guilford (chairman), J. D. Patterson, Thos. Fillebrown, A. O. Hunt, J. Hall Lewis.

Special Committee to Prepare Subjects and Questions for Preliminary Examinations.—Francis Peabody, W. Xavier Sudduth, Henry W. Morgan.

Adjourned to meet at the call of the Executive Committee.

The following colleges of the association were represented by the delegates named during the sessions:

Dental College of the University of Michigan—J. Taft.

- University of California, Dental Department*—C. L. Goddard.
University of Pennsylvania, Dental Department—James Truman.
Chicago College of Dental Surgery—Truman W. Brophy.
Indiana Dental College—J. E. Cravens.
Columbian University, Dental Department—J. Hall Lewis.
Pennsylvania College of Dental Surgery—C. N. Peirce.
State University of Iowa, Dental Department—A. O. Hunt.
New York College of Dentistry—Frank Abbott.
Dental Department of National University—J. Roland Walton.
Northwestern University Dental School—C. P. Pruyn.
American College of Dental Surgery—Louis Ottofy.
Baltimore College of Dental Surgery—M. Whilldin Foster.
Harvard University, Dental Department—Thomas Fillebrown.
Missouri Dental School—W. H. Eames.
College of Dentistry, Department of Medicine, University of Minnesota—W. Xavier Sudduth.
Louisville College of Dentistry—F. Peabody.
University of Maryland, Dental Department—F. J. S. Gorgas.
School of Dentistry, Meharry Medical Department of Central Tennessee College—G. W. Hubbard.
Vanderbilt University, Dental Department—Henry W. Morgan.
Kansas City Dental College—J. D. Patterson.
Boston Dental College—J. A. Follett.
Northwestern College of Dental Surgery—B. J. Roberts.
Ohio College of Dental Surgery—H. A. Smith.
Philadelphia Dental College—S. H. Guilford.
Dental Department of Southern Medical College—L. D. Carpenter.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE twelfth annual meeting of the National Association of Dental Examiners was held at the Columbia Dental Club, Chicago, Friday, Aug. 11, commencing at 10 A.M.; the president, Dr. W. E. Magill, in the chair. Owing to the death of Dr. Fred A. Levy, the late secretary, Dr. Edgar Palmer was appointed temporary secretary.

The roll-call of States resulted as follows:

<i>State.</i>	<i>Represented by</i>
California - - -	J. D. Hodgen.
Indiana - - -	{ M. H. Chappell, S. T. Kirk.
Kentucky - - -	
Louisiana - - -	C. S. Edwards.
Maine - - -	Joseph Bowen.
	D. W. Fellows.

New Jersey	-				{ G. Carleton Brown, F. C. Barlow.
Ohio	-	-	-	-	{ L. E. Custer, Jas. Silcott.
Pennsylvania	-	-	-	-	{ C. V. Kratzer, Louis Jack, W. E. Magill.
Tennessee	-	-	-	-	{ H. E. Beach, J. Y. Crawford.
Wisconsin	-	-	-	-	Edgar Palmer.
Massachusetts	-	-	-	-	J. Searle Hurlbut.
District of Columbia	-	-	-	-	{ Williams Donnally, H. B. Noble.
Illinois	-	-	-	-	C. Stoddard Smith.
Kansas	-	-	-	-	A. W. Callahan.
Mississippi	-	-	-	-	W. E. Walker.

The following resolution, laid over at the last annual meeting, was taken up :

"Resolved, That it is the sense of the National Association of Dental Examiners, that when a member of the dental profession presents a certificate of registration from a state board of dental examiners, duly created by law, that the same should entitle the holder of such certificate to registration without an additional examination in any State of the Union having a law to regulate the practice of dentistry."

Dr. C. Stoddard Smith offered the following amendment :

"Provided such certificate was obtained on examination."

Discussed by Drs. Donnally, Jack, Noble, Kirk, Smith, Crawford, and others.

The amendment was accepted, and the resolution was then laid over till the next annual meeting.

Reports were received from the following state boards: Wisconsin, Kentucky, California (verbal), Illinois (verbal), District of Columbia, Maine, Pennsylvania, Massachusetts, and Kansas (verbal).

Dr. Magill reported that there had been additional legislation passed in the State of Pennsylvania, dated June, 1893. (See *Dental Cosmos*, current volume, p. 571.)

Dr. C. G. Edwards said that on account of the difficulty experienced in finding persons to move against illegal practitioners under the old law, the State Board of Kentucky had had another law passed at the recent session of the legislature, requiring the registration of all practitioners of dentistry, which it was hoped would be enforced. Dr. Edwards also reported that at the recent meeting of the Kentucky State Association, a resolution had been passed, strongly condemning the use of secret remedies in dentistry.

Dr. J. Y. Crawford said that he had given much attention during

the last nine years to dental legislation, and had submitted propositions to some very good legal authorities. His thought was that laws should be introduced that would be retrospective in their action.

He thought that if the profession in the different States could agree upon what was desirable and draw up a law that would be simple and yet embrace all that was needed to protect the communities, that all of the States would eventually adopt it, and dental legislation would thus be uniform throughout the whole country. He insisted that the law should be so simple that there could be no chance of misconstruction, and that it should be drawn in conformity with the views of able jurists and intelligent people in other professions. It is not possible to draw up a law that will suit every dentist, but every reputable dentist should be taught that it is his duty to see that the law is enforced, and to assist in detecting those who practice illegally.

Dr. J. D. Hodgen presented and read the amendment to the California law passed at the last session of the legislature, which provides as a punishment for violation of the law, a fine upon conviction of not less than fifty nor more than two hundred dollars, or imprisonment for six months for each offense; half of the fines recovered to go to the common school fund of the county in which conviction occurs, and the other half to the informer.

A report from the Committee on Dental Colleges, recommending that it be established as a preliminary condition to the reception of applications to be placed upon the list of recognized colleges be admission to the National Association of Dental Faculties, was adopted.

On motion, it was ordered that applications received at this meeting lie over until next year.

The Committee on Colleges presented its final report, which stated that of the recognized schools for the session of 1892-93 the number of students was: Freshmen, 1429; Juniors, 927; Seniors, 433; Graduates, 320; Post Graduates, 44; one school not having reported. Of the unrecognized schools the number of students was: Freshmen, 111; Juniors, 54; Seniors, 22; Graduates, 20.

The committee also reported, through its chairman, Dr. Jack, the following list of colleges recognized by the National Association of Dental Examiners as reputable, as reported by the Committee on Colleges for 1893 and 1894:

1. Baltimore College of Dental Surgery, Baltimore, Md.
2. Boston Dental College, Boston, Mass.
3. Chicago College of Dental Surgery, Chicago, Ill.

4. College of Dentistry, Department of Medicine, University of Minnesota, Minneapolis, Minn.
5. Dental Department, Columbian University, Washington, D. C.
6. Dental Department, National University, Washington, D. C.
7. Northwestern University Dental School, formerly Dental Department of Northwestern University (University Dental College), Chicago, Ill.
8. Dental Department of Southern Medical College, Atlanta, Ga.
9. Dental Department of University of Tennessee, Nashville, Tenn.
10. Harvard University, Dental Department, Cambridge, Mass.
11. Indiana Dental College, Indianapolis, Ind.
12. Kansas City Dental College, Kansas City, Mo.
13. Louisville College of Dentistry, Louisville, Ky.
14. Missouri Dental College, St. Louis, Mo.
15. New York College of Dentistry, New York City.
16. Northwestern College of Dental Surgery, Chicago, Ill.
17. Ohio College of Dental Surgery, Cincinnati, Ohio.
18. Pennsylvania College of Dental Surgery, Philadelphia, Pa.
19. Philadelphia Dental College, Philadelphia, Pa.
20. School of Dentistry of Meharry Medical Department of Central Tennessee College, Nashville, Tenn.
21. University of California, Dental Department, San Francisco, Cal.
22. University of Iowa, Dental Department, Iowa City, Ia.
23. University of Maryland, Dental Department, Baltimore, Md.
24. University of Michigan, Dental Department, Ann Arbor, Mich.
25. University of Pennsylvania, Dental Department, Philadelphia, Pa.
26. Vanderbilt University, Dental Department, Nashville, Tenn.
27. Western Dental College, Kansas City, Mo.
28. Minnesota Hospital College, Dental Department, Minneapolis, Minn. (Merged into No. 4.)
29. St. Paul Medical College, Dental Department, St. Paul, Minn. (Merged into No. 4.)
30. American College of Dental Surgery, Chicago, Ill.

On motion, the report of the committee was adopted, and the thanks of the association returned to the committee for their services.

The election of officers for the ensuing year was then proceeded with, resulting as follows: C. Searle Hurlbut, president; M. H. Chappell, vice-president; J. D. Hodgen secretary and treasurer, 917 Sutter St., San Francisco, Cal.

Adjourned to the time and place of the next meeting of the American Dental Association.

DENTAL SOCIETY ANNOUNCEMENTS.

OFFICERS AND COMMITTEES OF PENNSYLVANIA STATE DENTAL SOCIETY FOR 1893-94.

F. L. Bassett, Philadelphia, president.	R. B. Cummins, Blairsville, assistant secretary.
J. A. Libbey, Pittsburg, first vice-president.	H. E. Roberts, 1321 Walnut street, Philadelphia, corresponding secretary.
G. W. Green, New Castle, second vice-president.	H. N. Young, Wilkes-Barre, treasurer.
C. V. Kratzer, 111 North Fifth street, Reading, recording secretary.	

State Dental Examining Board.

W. E. Magill, Erie, president.	C. S. Beck, Wilkes-Barre.
J. C. Green, West Chester, secretary.	Louis Jack, Philadelphia.
J. A. Libbey, Pittsburg.	L. Ashley Faught, Philadelphia.

Board of Censors.

G. W. Klump, Williamsport.	J. B. Keifer, Altoona.
George Culbertson, Greensburg.	W. A. Kessler, Pittsburg.
W. H. Fundenberg, Pittsburg.	

Executive Committee.

H. E. Roberts, Philadelphia.	W. F. Litch, Philadelphia.
H. N. Young, Wilkes-Barre.	G. W. Klump, Williamsport.
W. E. Magill, Erie.	

Publication Committee.

W. E. Magill, Erie.	E. P. Kremer, Lebanon.
W. H. Fundenberg, Pittsburg.	E. C. Kirk, Philadelphia.
G. W. Green, New Castle.	C. V. Kratzer, Reading.
J. B. Keifer, Altoona.	

Committee on Legislative Action.

G. W. Klump, Williamsport.	Alonzo Boice, Philadelphia.
C. N. Peirce, Philadelphia.	H. N. Young, Wilkes-Barre.
J. A. Libbey, Pittsburg.	J. P. Thompson, Johnstown.

Committee on Enforcement of Dental Law.

L. Ashley Faught, Philadelphia.	Alonzo Boice, Philadelphia.
J. C. M. Hamilton, Tyrone.	W. A. Phreaner, Philadelphia.
W. H. Fundenberg, Pittsburg.	

Clinical Committee.

P. K. Filbert, Pottsville.	R. B. Cummins, Blairsville.
D. N. McQuillen, Philadelphia.	

The next annual meeting will be held at Cresson, Pa., July 10, 1894.

WEST VIRGINIA STATE DENTAL SOCIETY.

The annual meeting of the West Virginia State Dental Society will be held at Parkersburg, October 4, 1893. The profession is cordially invited.

J. N. MAHAN, *President*, Charleston.

GEORGE I. KEENER, *Secretary*, Morgantown.

LIST OF DENTISTS REGISTERED AT THE WORLD'S COLUMBIAN
DENTAL CONGRESS.

- Frank Abbott, New York, N. Y.
 J. T. Abbott, Manchester, Ia.
 F. J. Adams, Ontario, Can.
 H. Addicks, Hanover, Germany.
 Oscar Adelberg, Elizabeth, N. J.
 Florestan Aguilar, Cadiz, Spain.
 H. S. Ainsworth, Van Wert, O.
 C. L. Alexander, Charlotte, N. C.
 Geo. S. Allan, New York, N. Y.
 E. H. Allen, Freeport, Ill.
 Geo. S. Allen, South Englewood, Ill.
 M. H. Allen, Tipton, Ind.
 T. M. Allen, Birmingham, Ala.
 H. W. Allwine, North Platte, Neb.
 H. L. Ambler, Cleveland, O.
 W. B. Ames, Chicago, Ill.
 E. W. Anderson, Indianapolis, Ind.
 R. P. Anderson, Mockville, N. C.
 C. L. Andrews, New York, N. Y.
 F. J. Andrews, Toronto, Can.
 G. F. Andrews, St. Paul, Minn.
 R. R. Andrews, Cambridge, Mass.
 E. H. Angle, Minneapolis, Minn.
 M. F. Ault, Kokomo, Ind.
 R. B. Avery, Auburn, N. Y.
 J. N. Ayer, Raleigh, N. C.
 D. C. Bacon, Chicago, Ill.
 Marie Thompson Bacon, Chicago, Ill.
 C. M. Bailey, Minneapolis, Minn.
 Emery Bailey, Lewiston, Me.
 H. M. Baird, St. Louis, Mo.
 W. H. Baird, Burlington, Ia.
 B. H. Baker, Wilmington, Del.
 C. R. Baker, Davenport, Ia.
 F. H. Baker, Chicago, Ill. (student).
 Hester J. Baker, Quincy, Ill.
 C. N. Baldwin, Oak Park, Ill.
 E. H. Ball, Tama, Ia.
 J. W. Ball, Boston, Mass.
 S. Ball, Marion, Ala.
 LaFayette L. Barber, Toledo, O.
 A. M. Barker, San José, Cal.
 H. B. Barker, Naperville, Ill.
 Fred C. Barlow, Jersey City, N. J.
 J. D. Barnes, Chicago, Ill.
 Florencia de la Barrera, Santa Clara,
 Cuba.
 W. C. Barrett, Buffalo, N. Y.
 M. A. Bartleson, Denver, Col.
 W. J. Barton, Paris, Tex.
 F. L. Bassett, Philadelphia, Pa.
 Joseph Bauer, New Orleans, La.
 E. C. Baxter, Albany, N. Y.
 H. E. Beach, Clarksville, Tenn.
 D. V. Beacock, Brockville, Can.
 E. P. Beadles, Danville, Va.
 Thos. W. Beckwith, Sterling, Ill.
 E. M. Beesley, Belvidere, N. J.
 F. T. Bell, Aurora, Ill.
 J. R. Bell, Cleveland, O.
 Emma L. Benham, Chicago, Ill.
 E. K. Bennington, Delavan, O.
 S. L. Benson, New York, N. Y.
 C. E. Bentley, Chicago, Ill.
 F. H. Berry, Milwaukee, Wis.
 A. O. Best, Savannah, Ga.
 L. P. Bethel, Kent, O.
 C. S. Bigelow, Chicago, Ill.
 W. D. Billings, Chattanooga, Tenn.
 U. D. Billmeyer, Chattanooga, Tenn.
 H. E. Birch, Clarkesville, Tenn.
 I. Charter Birch, Leeds, England.
 Fred H. Birchmeier, Chicago, Ill.
 M. A. Birge, Grand Rapids, Mich.
 W. W. Birkhead, Louisiana, Mo.
 J. Adams Bishop, New York, N. Y.
 G. V. Black, Jacksonville, Ill.
 E. K. Blair, Waverly, Ill.
 Chas. E. Blake, Sr., San Francisco,
 Cal.
 E. O. Blanchard, West Randolph, Vt.
 M. A. Bland, Charlotte, N. C.
 C. W. Blende, Chicago, Ill.
 Hans Block, Chicago, Ill.
 Geo. D. Boardman, LL.D., Philadel-
 phia, Pa.
 W. E. Boardman, Boston, Mass.
 C. F. W. Bödecker, New York, N. Y.
 E. A. Bogue, New York, N. Y.
 P. S. Bollinger, Dayton, O.
 Scipio Bond, Anoka, Minn.
 W. G. A. Bonwill, Philadelphia, Pa.
 Van Loenan de Bordes, Amsterdam,
 Holland.
 R. R. Bourne, Hopkinsville, Ky.
 A. G. Bouton, Savannah, Ga.
 G. A. Bowman, St. Louis, Mo.
 J. A. Bowman, Minneapolis, Minn.
 C. L. Boyd, Eufaula, Ala.
 W. Brace, Brockville, Can.
 L. Bredouw, Kansas City, Mo.
 F. T. Breene, Iowa City, Ia.
 R. C. Brewster, Brooklyn, N. Y.
 H. Feilden Briggs, Torquay, England.
 E. T. Brigham, Watseka, Ill.
 J. M. Brimacombe, Bowmansville,
 Can.
 A. H. Brockway, Brooklyn, N. Y.
 G. A. Bronson, St. Louis, Mo.
 Truman W. Brophy, Chicago, Ill.
 E. D. Brower, LeMars, Ia.
 A. E. Brown, Chicago, Ill.
 E. Parmly Brown, New York, N. Y.
 G. Carleton Brown, Elizabeth, N. J.
 G. V. I. Brown, Duluth, Minn.
 H. C. Brown, Gallipolis, O.
 J. B. Brown, Bloomington, Ill.
 S. B. Brown, Fort Wayne, Ind.
 W. S. Brown, Charleston, S. C.
 F. N. Browne, Chicago, Ill.

- W. G. Browne, Atlanta, O.
 A. P. Brubaker, Philadelphia, Pa.
 Lyman C. Bryan, Basle, Switzerland.
 W. C. K. Buchanan, Kansas City, Mo.
 J. Freemont Burket, Kingman, Kan.
 H. J. Burkhart, Batavia, N. Y.
 W. E. Burkhart, Tacoma, Wash.
 Alfred Burne, Sydney, Australia.
 Jabez B. Burns, Chicago, Ill.
 John S. Burrett, Salto, Uruguay.
 E. V. Burt, LaFayette, Ind.
 C. R. Butler, Cleveland, O.
 Chas. S. Butler, Buffalo, N. Y.
 A. I. F. Buxbaum, Cincinnati, O.
 E. C. Buxton, Albany, N. Y.
 C. L. Cadwallader, Madrid, Spain.
 R. G. Caldwell, Seattle, Wash.
 J. R. Callahan, Cincinnati, O.
 J. T. Calvert, Spartanburg, S. C.
 H. W. Campbell, Suffolk, Va.
 John Campbell, Bloomington, Ill.
 S. A. Campbell, Mattoon, Ill.
 W. A. Campbell, Brooklyn, N. Y.
 Fred J. Capon, Toronto, Can.
 D. Caracatsanis, Athens, Greece.
 H. P. Carlton, San Francisco, Cal.
 P. H. Carlyon, Olympia, Wash.
 E. R. Carpenter, Chicago, Ill.
 L. D. Carpenter, Atlanta, Ga.
 Isaac N. Carr, Tarboro, N. C.
 Wm. Carr, New York, N. Y.
 C. C. Carroll, Chicago, Ill.
 W. M. Carter, Sedalia, Mo.
 C. S. Case, Chicago, Ill.
 J. M. Case, Pomona, Cal.
 J. S. Cassidy, Covington, Ky.
 D. M. Cattell, Chicago, Ill.
 M. L. Chaim, New York, N. Y.
 A. H. Chamberlain, Rome, Italy.
 W. F. Chambers, Chicago, Ill.
 J. S. Chance, London, O.
 Ella Z. Chandler, St. Paul, Minn.
 V. K. Chandler, Delavan, Ill.
 M. H. Chappell, Knightstown, Ind.
 Emma E. Chase, St. Louis, Mo.
 Price Cheaney, Chicago, Ill.
 G. F. Cheney, St. Johnsbury, Vt.
 J. D. Chilcoth, Bangor, Me.
 E. S. Chisholm, Tuscaloosa, Ala.
 J. C. Chisholm, Greensboro, Ala.
 Geo. A. Christmann, Chicago, Ill.
 A. R. Church, Mayfair, Ill.
 B. J. Cigrand, Chicago, Ill.
 P. J. Cigrand, Chicago, Ill.
 F. M. Cilley, Chicago, Ill.
 D. M. Clapp, Boston, Mass.
 A. B. Clark, Chicago, Ill.
 W. G. Clark, Cedar Rapids, Ia.
 Eugene C. Clarke, Bangor, North
 Wales, England.
 K. L. Cleaves, Montpelier, Vt.
 James Cleland, Detroit, Mich.
 Geo. B. Clement, Macon, Miss.
 T. W. Clements, Brookline, Mass.
 E. L. Clifford, Chicago, Ill.
 W. R. Clifton, Waco, Tex.
 J. W. Clowes, New York, N. Y.
 James P. Cochran, Denver, Col.
 H. J. Cole, Norfolk, Neb.
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EDITORIAL.

THE LESSONS OF THE CONGRESS.

THE record which we give in this issue is, so far as the tangible results are concerned, a fair presentment of the work accomplished by the World's Columbian Dental Congress. It shows the consummation of an effort which has occupied the time and enlisted the ability and enthusiasm of those who were personally pledged to the success of the movement. The forces which led up to the organization and development of the Congress we have already outlined in a historical way elsewhere in this issue. It may be well to consider some of the fruits which the work has already produced, and those which are likely to arise from it in the future.

The record speaks for itself. Eight sections were occupied during six days with the consideration of problems submitted in the form of papers, in addition to the work in the same line at the general daily sessions of the Congress; these included two evening meetings, at which subjects in dental anatomy and histology were illustrated by the lantern projection of photo-micrographs. The clinics were numerous, occupying the hours of the morning previous to each gen-

eral session of the Congress ; in scope they embraced every department of dentistry in its latest phase of development. The exhibits of instruments and appliances, both technically and historically, were of great interest, while the results achieved by the special committees having in charge the historical and educational factors of dentistry are invaluable. In this connection, and without the least reflection upon the work of other departments, we feel that the monumental work accomplished by the Committee on Nomenclature, as embodied in the report of its chairman, is in itself a result upon which the dental profession might be congratulated, even if the holding of the Congress had brought out little else.

These items represent the results which are immediate and visible ; but there are, however, other and farther-reaching results which in their way are equally as important, if not more so. Most prominent of these was the civilizing effect (we do not know how to better characterize it) which was developed through the personal contact of the members in this international congress of dental practitioners. Every shade of opinion was afforded an opportunity for comparison and criticism ; individual views were illuminated by the side-lights of diverse thought from varied sources, which demonstrated the many-sidedness of truth and developed and maintained a spirit of mutual respect and tolerance, so that an impetus was given to the spirit of professional progress by the harmony of action which prevailed. The feeling of confraternity was intensified and strengthened by the several social gatherings incident to the Congress, to which the demands upon our space prohibit more than allusion. Representative dentists from twenty-seven different nations were brought into close professional and social contact under circumstances which could not and did not fail to develop a most harmonious bond of fellowship and sense of the community of dental professional interest hitherto unattainable. The experience gained in the holding of this, the first congress of dental practitioners international in character and limited in membership requirements only by the recognized dental ethical standards of the several nations represented, indicates clearly the value of such a meeting, as well as the good to be derived from the continued holding of such congresses at proper intervals of time. An international dental congress based upon lines less comprehensive than those which characterized the one just closed must in the very outset be limited to the interests of the class or sect in dentistry, and not the dental profession as a whole. The healthy and rapid progress of dentistry as a whole can be best promoted by the means which tend to unity of action and co-operative effort, not by sectarianism and exclusivism.

That there is a valuable work to be done by meetings of those interested in developing special lines of research in dentistry is not questioned, especially when such work is confined to scientific or utili-

tarian objects, nor can there be any objection urged against the holding of meetings by branches of the dental profession whose members are pledged to certain fundamental tenets which in effect are more or less exclusive of all classes of practitioners who do not subscribe to the particular creed under consideration. These all have their place, and each is in its way valuable in so far as it may demonstrate the rightfulness of its position, or in an educational way so affect the balance of the profession as to raise the standard of dental requirements and improve the ethical and educational features of dentistry. But in addition to and beyond the kind of meetings which are exclusive and limited in character, there is not only room but an actual need for the occasional holding of such a meeting as the World's Columbian Dental Congress just closed. A meeting that represents the status of dentistry as it is throughout the world, while it may result in a showing in some respects unsatisfactory to those who hold dogmatically to special views respecting the problems which affect our professional status, must also result in a better understanding of these very problems, and the solidarity of the profession is emphasized by the opportunity which a world's dental congress affords for comparison of diverse ideas and interchange of thought along the line noted.

A notable example of the value of such a meeting as the World's Columbian Dental Congress was furnished in the better understanding which all in attendance derived regarding the international relationships of dentistry. Especially was this true with respect to our mutual relations in the case of England and France. Had the most regrettable misunderstandings which arose in relation to the organization and foundation principles of the Congress been avoided by a proper official explanation of the case, the representation of those countries would have been much fuller, and their cordial and enthusiastic support and co-operation would have been secured. As it was, those who were present from England and France we believe carried away with them a clear concept of the spirit and broad plan upon which the Congress was held. This we trust may in considerable degree help to a better understanding by their constituents of the motives of cordial good-will and *esprit de corps* which animated the organization, as it has undoubtedly helped to wipe out any feeling of resentment upon the part of American dentists created by their misunderstanding of the attitude of some of their foreign confrères. The awarding of the prize essay medal to Mr. George Cunningham, of Cambridge, England, was in this regard a source of much gratification to those interested, not alone because of the exceptionally high character of his essay, but because it was in some sense a tribute animated by the fraternal regard entertained for the profession of England, despite individual differences of opinion, and gave additional emphasis to the impersonal, universal spirit of the Congress.

OBITUARY.

DR. W. C. WARDLAW.

DR. W. C. WARDLAW, a distinguished dentist of Augusta, Ga., died September 3, 1893. A more extended notice of his decease may be looked for in our October issue.

DR. R. M. STREETER.

DIED, in New York city, July 6, 1893, of heart-failure, RANSEL MORTIMER STREETER, M.D., in the fifty-fifth year of his age.

Dr. Streeter was born in Chesterfield, N. H., on the 23d of March, 1839. He was a graduate of the University Medical College of New York, and began the practice of dentistry in New York about twenty-five years ago. As a professional man he became quite eminent, being noted for his excellent and finished work in operative dentistry and his skill in oral surgery. He was a devotee of art, was popular in social life, and took a keen interest in public affairs.

Dr. Streeter was a member of the New York Odontological Society, the New England Dental Society, the County Medical Society, the Academy of Medicine, and of the Union League.

In 1867 Dr. Streeter was married to Miss Harriet Dailey, of Sheffield, Mass., who survives him. They had no children.

DR. JOHN COLBORNE GRASSE.

DIED, at Seattle, Washington, June 10, 1893, DR. JOHN COLBORNE GRASSE, in the fiftieth year of his age.

Dr. Grasse was born in Kingston, Ontario, Dec. 3, 1853. After completing his studies at Queen's College, Ontario, he began the study of dentistry. In 1869 he moved to Nevada to practice his chosen profession. Later, in 1871, he moved to Seattle, where he enjoyed a lucrative practice until the time of his death.

Dr. Grasse was the first president of the Washington Territorial Dental Society, and the oldest practicing dentist in the state. He was progressive in his profession, and a kind and indulgent husband and father. In 1877 he was married to Miss Eva L. Hansbron, who with a daughter of seven years survives him.

DR. J. W. MEISGEIER.

DIED, in Pasadena, Cal., March 31, 1893, of phthisis pulmonalis, JOHN WILLIAM MEISGEIER, D.D.S., in the thirty-third year of his age.

Dr. Meisgeier was born in Philadelphia, June 26, 1860. He was educated in the public schools, and early gave his attention to the study of music, becoming master of the violin and viola. After some professional travel, he obtained a steady position as viola player in one of Philadelphia's leading theaters. During this engagement he took up the study of dentistry, and matriculated at the Pennsylvania College of Dental Surgery, graduating

at that institution in March, 1890. His health declining, he went to Denver, Colorado, by advice of his physician, and began the practice of his profession there. His health somewhat improved, and he was rapidly acquiring an extended practice; but diligent application and increased business caused another decline in his health from lung-trouble, and he went to Pasadena, Cal., for recuperation. He remained there about a year, but finally broke down under his disease, and died as above recorded.

Dr. Meisgeier was unmarried. He was a man of rather prepossessing appearance, a close student, and took great pride in his chosen profession of dentistry. He had many friends who sincerely deplore his early death.

PERISCOPE.

AMERICAN DENTAL DEGREES.—It will be remembered that at their last meeting the General Medical Council decided to cease recognition of the certificates of the degrees of Doctor of Dental Medicine of the University of Harvard, and Doctor of Dental Surgery of the University of Michigan, until further notice. This resolution was come to in accordance with the provisions of the Dentists' Act, which enabled the council to recognize "for the time being," the Harvard and Michigan qualifications. This *proviso* has served its purpose, and since it has come to the knowledge of the council that the preliminary examinations of the universities are below the council's own standard, they could not consistently continue to recognize the diplomas,—at least, in the case of those who have commenced their dental studies since the Dentists' Act passed into law.

We are naturally curious to see how American dental authorities regard this resolution, and that is fairly expressed in DENTAL COSMOS, one of the leading exponents of American dentistry. Our contemporary considers that the council's resolution presents two distinct elements—first, the assumption of superiority of the English dental curriculum, with its necessary implication that this same superiority is a characteristic of the product of that curriculum; and, secondly, the justice of their exclusion act, which is also based upon this asserted superiority as noted. "If we grant the major premise of English superiority in dental educational matters, then the justice and consistency of the exclusion act admit of no further argument. It is simply a legitimate exercise, under the sovereignty of the state, of its proper authority, everywhere conceded among intelligent people as necessary and right for the protection of its citizens." But there are other considerations than these, and perhaps the most important is the fact that the council recognized only two American diplomas, although there are at least a dozen of equal value. It is, therefore, right that the whole of them should be placed on an equal platform. The Cosmos also approves of the principle that the dentist should be a thoroughly educated man, but we question if our contemporary fully appreciates the gravity of the General Medical Council's case, which is essentially that of the whole nation in regard to professional or semi-professional callings,—viz, that those who enter such occupations must show at the beginning a certain standard of classical, historical, linguistic, and mathematical knowledge. We, as Englishmen, maintain that that is a necessary basis for professional education, and this is a point which American educational institutions have not, except in a few instances, arrived at. As we had recently occasion to show, it is true of American pharmacy; it is also true in regard to dentistry, and we have a strong suspicion that medical degrees are granted in the United States to persons to whom orthography is one of the greatest difficulties of life. It is for Americans themselves to look to this matter, and by earnest agitation to secure a uniform standard of preliminary education for all who enter the learned professions.

The second element in the General Medical Council's decision which our contemporary refers to—viz, the assumed superiority of English dentistry—is one which should be closely watched. We are afraid the COSMOS is right in saying that "this English dental exclusion act has made itself manifest in the development of a pharisaical attitude on the part of some of the dental profession of England with respect to American dentistry." The trouble is that the pharisaical attitude existed before the General Medical Council's resolution. There is a small but influential set of men in the dental profession who have been persistent in attacking American dentistry as practiced in England, and we are not quite sure that it is not their bitterness which has led up to the Medical Council's resolution. However that may be, one thing is certain,—viz, that this pharisaical attitude is not general. There is a wholesome respect in this country for American dentistry. It is felt that many modern improvements in dental mechanics are of American origin, and if in more recent times English methods have been able to hold their own that is largely due to the fact that our cousins across the Atlantic have taught us a great deal.—*The Chemist and Druggist* (London).

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY, 1893.

- July 11.—No. 501,075, to WILLIAM A. JOHNSTON and ARTHUR W. BROWNE. Dental engine.
- “ “ No. 501,127, to HENRY C. WOFFORD. Dental tool.
- “ “ No. 501,429, to MAX J. F. KNEIFF. Artificial tooth.
- July 18.—No. 501,741, to GEORGE W. SIMPSON. Dental articulator.
- July 25.—No. 501,961, to CHARLES K. RICHARDSON. Means for regulating electric motors.
- “ “ No. 502,164, to GEORGE K. BAGBY. Dental articulating cup.
- “ “ No. 502,209, to WARREN M. SHARP. Apparatus for casting aluminum-dental plates.

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ORIGINAL COMMUNICATIONS.

GINGIVITIS NUDATA.*

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HAVING lately had the opportunity of observing a case of gingivitis nudata at the dental clinic under my charge, I wish to describe its general features. Its peculiar character would not have escaped the notice of any good observer, yet we do not find any account of this kind of gingivitis in dental literature. We have, therefore, to give not only a description but a name to this disease, to which, from its pathological character, we give the technical name of gingivitis nudata. Cases of it are very rare. In ten years, both in the clinic and in private practice, I have not been able to find more than eight or ten genuine cases. As in the case of many other newly discovered diseases, it is possible that here also cases will arise in increasing numbers as soon as its existence is generally known. As an example we give at length the most recent case observed.

Victoria S., girl, nineteen years old, sickly; for some weeks under treatment for chlorosis at the university clinic.

For three days the patient had been complaining of pains in the roof of the mouth. She was transferred to the dental clinic on the 2d of May, 1893, for consultation and treatment.

Status Præsens.—The mucous membrane of the mouth of the chlorotic invalid is in general pale. The mucous membrane on the roof of the mouth and on the interdental papillæ is not smooth, but shows little grains hardly perceptible to the naked eye. The interdental papillæ, as well as the folds of the roof of the mouth, look as if they were swollen, are without luster, quite dry, and stick when touched with the tips of the fingers. The same adhesiveness can be shown by touching delicately with some light instrument,—e.g., with a root-canal probe.

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“Professor Dr. Arkövy, about ten years ago, in the course of his lecture on special (dental) pathology and therapeutics, explained this kind of disease. It is different from other kinds of gingivitis previously known, both in its nature and symptoms, and clear cases were repeatedly observed and exhibited in the auditorium.” (Mitth. von L. Hattysay.)

Etiology.—The cause of this disease is to be found partly in a scalding of the mucous membrane of the mouth; cases also have occurred in which it was not possible to discover the really active cause. The scalding cannot be regarded as the exclusive cause, since this assumption is contradicted by the rare occurrence of the disease, while men frequently scald their mouths. This cause is also not to be reconciled with the long duration of the disease. We have had the opportunity of proving a duration of one to two years. This was in the case of two women. One, fifty years old, suffered two years; the other, thirty-eight to forty years old, suffered about a year. On the other hand, it is well known that scalded spots in the mouth recover their epithelial covering in a few days. So far as the frequency is concerned, there are many more cases observed where this change in the labial surface of the gums (upper jaw) was due to immoderate brushing of the teeth. But here again the sore heals very quickly. It is very probable that mechanical stimuli could also contribute to the production of gingivitis nudata; and several cases were observed where the patients had artificial teeth (upper plates) in which the piece was either rough or did not fit exactly.

Localization.—The disease has its seat in the roof of the mouth, but sometimes spreads over the gums, involving the interdental papillæ, or it is limited to the latter. The boundaries of the surface affected cannot be made out with the naked eye, since the edges are not at all pronounced and do not show any deviation from the normal color. Touching offers the only means of recognizing the boundaries, by which means the extent of the disease is discovered in the lusterless and sticky mucous membrane. The labial and buccal gingivæ are never found within the circle of the disease.

Pathological Nature.—If the change is observed by means of a microscope, it is noticed that the epithelial layer of the mucous membrane is entirely lacking on the diseased surface, and the Malpighian layer (papillæ) is exposed.

I have not yet had the opportunity to observe a stadium bullosum.

Symptoms.—These are evidenced by the continual burning,—feeling of heat; further, by a sensitiveness to touch amounting almost to pain during and particularly after meal-times. In those cases where the disease was seen in connection with artificial teeth, the patients complained always after a continuous use of them, and on this account were continually taking the plates out of the mouth. In regard to the latter cases, we might suppose that besides the property of caoutchouc as a poor conductor of heat, some special and individual property of the mucous membrane of the mouth also plays a part, since every one knows that there are numerous cases of badly fitting plates where this kind of change (gingivitis nudata) does not occur.

Diagnosis.—This is made on grounds of etiology, localization, and symptoms. The chief basis for a diagnosis is afforded by the denudation of the layers of papillæ of the mucous membrane, their adhesiveness, and the feeling of burning.

Course.—The decisive cases observed were first seen at various periods of the disease ; we could mostly suppose a progress of a few weeks or two or three months ; but there were cases which had lasted one to two years,—a sign that the disease can continue to exist without healing spontaneously. In the latter cases, according to the account of the previous history of the disease, there were intervals of cessation of several weeks, after which the symptoms described reappeared. Where the region of denudation of the epithelium was greater the duration of the disease was shown to be longer, as might be expected. In regard to its course, the age of the individual seems to play no part, since in the year 1885 we had the opportunity of observing gingivitis nudata in the case of a twelve-year-old boy, which extended over half of the roof of the mouth and all of the labial and interdental papillæ. In the following years the two women before mentioned (forty to fifty years old) were observed ; the course was in both cases equally stubborn and enduring.

Therapy.—This consists in abstinence from the use of irritating agencies and foods. To counteract the irritation, slippery, mucilaginous medicaments or foods seem to be indicated. The patients must be ordered also to avoid foods that cause mechanical friction. The diet could therefore be arranged as follows :

Breakfast. Sago soup, lukewarm milk or coffee.

Dinner. Rice soup, or meat-broth with the yolk of eggs ; omelet prepared with milk, with little or no salt ; rice in milk ; millet or groats thoroughly cooked ; meat only as hash.

Supper. One of the meals given above.

Mucilaginous gargling water can also be prescribed, as : Decoct. tub. salep, or decoct. rad. althæa ; an addition of some cocain or formamid seems to be of further benefit.

Taking as a basis the experiments mentioned, we tried this method of treatment on both of the patients named. The condition of the patient improved from day to day ; on the fourth day the pain had entirely ceased, and the mucous membrane appeared again covered with a thin layer of epithelium.

This method of treatment or diet we tried to fit to the nature of the evil, and it is very probable that a surgical operation or any other kind of medical treatment, especially the application of astringents, would not only not lead to the goal, but make the condition of the patient still worse.

It would be of interest if decisive observations could be published from other quarters, particularly if some one should succeed in finding a quick and still effectual method of treatment which, in view of the lingering nature of this disease, would be of great benefit to the patients.

AMALGAM AS A RESTORER IN EXTENSIVE LOSS OF CORONAL SURFACES.

BY DR. W. B. SHERMAN, SAN FRANCISCO, CAL.

A PLEA for the use of amalgam in extensive loss of tooth-structure at this late day would be entirely superfluous. This derided substitute has won for itself the just recognition it enjoys. Its invaluable

aid as a tooth-conserving has received acknowledgment. As time goes on new possibilities for its use are developed, and secure for it even a higher plane in our estimation. It is concerning one of these newly developed possibilities of which we wish to speak. In its valuable office of restoring contour and masticating surfaces, it is especially applicable to molars and bicusps, and not only for the restoration of surfaces in these teeth, but in a measure for giving to the individual that extension of masticating surface which has been lost by the extraction of one or more teeth. We cannot but deprecate the fact that restoration of contour in amalgam work has not received the same recognition in its use that gold has for this purpose. We know that the restoration of a tooth to its natural outlines is the best thing for that tooth, and with the best gold work this is always attempted. Why should we fall short of this standard in our amalgam work? Why, if it is perfected practice in one case, should it be less so in the other? Just as complete restoration should be made with the one as the other, and he who is satisfied with anything short of this standard falls just so far short of putting that tooth into a condition for its greatest ultimate usefulness.

More attention in contour work has been given to the sides of the teeth than to their coronal surfaces. This is a mistake; not that less work of this class should be done upon the former, but that more should be done upon the latter. While complete contour in one case may reduce to a minimum the liability of the recurrence of decay, in the other case such completion materially increases the efficiency of these organs in their function as masticating agents,—a desideratum of no small moment, as this is their chief end. A gold-worker will build up and contour his cusps, imitating nature as accurately as his skill will admit; but it is seldom that we see such in the amalgam line, the idea being that fullness constitutes a sufficiency, that a completely filled cavity is all that is necessary. For a perfect crushing of the food something more is requisite than a mere coming together and lateral movement of flat surfaces. The work is much more completely done if those surfaces are provided with sulci and cusps, and these perfectly antagonize one with the other in the opposing jaws. In this way the extent of masticating surface of a denture is increased. What can amalgam do to this end where some teeth are missing? In some instances, though not in all, it can do wonders toward such a consummation. Let a mouth present in which one or two teeth have been lost, and where those remaining have arranged themselves so as to leave considerable space between each tooth, and we have a case where amalgam can furnish more or less additional masticating surface.

In such cases, great annoyance comes from the packing of food between the teeth, necessitating, in proportion as one has nervous attributes, its immediate removal, or no comfort is possible in eating. The bridging of these spaces by amalgam from one tooth to another will accomplish both purposes. It must, however, be done rightly and with the proper grade of materials. At first one space was alone bridged, but we now have record of a few years' standing of such cases where two, or even three, contiguous spaces were so treated, and successfully, as the result has shown.

It is admitted that cavities must either exist advantageously placed,

or must be so made. A distal or disto-morsal cavity in one tooth must have as its counterpart a mesial or mesio-morsal cavity in the tooth next in line. Where it is desired to bridge over two contiguous spaces, the tooth between these spaces may be of almost any abnormal shape. A mere root can be utilized to good advantage as a pier to the bridge. When a tooth is normal, conservative operators may, however, hesitate to mar its natural outlines for this purpose. Let the urgency of the case decide this. An advantage secured many times in this operation is the support given to loose teeth, it being recognized in this direction that such loose tooth must stand between the space to be bridged, and the amalgam made continuous over this, to insure the best results; for a loose tooth at either end of the bridge would soon work itself free from a close adaptation with the amalgam, or at least the conditions for fracture of its walls would be present. For the successful accomplishment of such an operation two grades of amalgam alloy should be used. This is especially true where the decay has advanced near to or under the gum-line. Some good, recognized submarine alloy should be first employed, and the adaptation to the cervical margin made perfect. Half of the cavity from the gum toward the periphery of the tooth should be filled with this grade of amalgam, and the bridge completed with any high-grade, heavily silvered gold alloy. Such an alloy is found in Flagg's "Contour." This grade of amalgam in its setting is firm, prompt, and dense, with excellent edge strength,—attributes which alone make possible the successful use of amalgam for bridging, and which give the successful plastic-worker such satisfaction in his work. Distal and mesial cavities are prepared as though for simple filling, care being taken to leave no overhanging wall of enamel upon their sides, for this would be sure to fracture under the strain. After the submarine amalgam has been introduced to its proper level in the cavity, a small roll of chamois-skin, suited in size to the space it is to occupy, is placed between the teeth and pressed down hard upon the gum, which latter should have been previously treated by a cocain application. Chamois-skin is used in preference to cotton, as there are no fibers, and as it leaves a better finish to the amalgam surface.

The high-grade alloy is now worked in upon the submarine, while the latter is yet plastic, and over the chamois to the submarine in the second cavity. Its hardening is hastened by pelleting.

The application of the rubber-dam should have preceded the introduction of the filling-material. The distal cavity should receive attention first, working from before backward, thus facilitating the work. Proper articulation with the antagonizing teeth is made after sufficient hardness is obtained and the dam removed. Caution should be observed in the closing of the teeth not to fracture the bridge, and the points of contact marked by articulating paper.

The tedious part of the operation is now at hand: the making of the proper depressions to receive the cusps of the opposing teeth, and the rounding off of the cusps themselves. It is well to allow the material to harden thoroughly before it is removed. If the proper grade of alloy has been used, one-half hour's time should give it ample scope in which to do this. The roll of chamois-skin should be left until the patient is discharged, not longer,—as separation of the teeth might occur, and make futile our efforts. Two or more con-

tiguous broken-down teeth have been treated with good results, the satisfaction to the patient being manifest in a few days, after the novelty of the innovation has worn off. Objection to this operation may be made by its establishing pockets for the retention of the food. This objection is tenable, and if habits are slovenly in regard to the care of the teeth, may hold good ; but where care is used and a tooth-pick kept at work it becomes of no importance.

If it is found that space enough was not left after the withdrawal of the chamois-skin, a few revolutions of the fissure-bur will increase it.

It has been pertinently asked, What are the limits of the successful application of plastics? It is not yet time to answer that question.

DENTAL DIAGNOSIS.

BY W. H. METCALF, D.D.S., NEW HAVEN, CONN.

OWING to the comprehensiveness of this subject, it is necessary to call attention to two primary objects which have prompted its consideration.

While bearing in mind the importance, in diagnosis, of the careful study of temperaments, diatheses, hereditary tendencies, predispositions, and idiosyncrasies, as they bear upon or influence the character of human teeth, and recognizing the many causes, incidental and insidious, which claim close attention and constant watchfulness, and about which much has been written and spoken, the writer nevertheless finds it more expedient to pass on, first, to the direct analysis of the subject in hand,—viz, the correct method of seeing or diagnosing ; and second, to emphasize the necessity of a closer communion, by consultation, between the specialists of the medical profession.

To diagnose with accuracy, in addition to a familiarity with the aspects of disease, some knowledge of the philosophy of life is absolutely essential. It may be an innate faculty,—that is, may dwell with a man in some degree naturally,—but usually it has to be acquired by long practical experience and the diligent study of natural causes and effects, and is indispensable to true success. The term "life" is more than physiological, more than ethnological. It is our one entity. It soars above, permeates, and fathoms nature. Can we catch it, cage it, study it? Are we not too prone to forget that life is a principle,—that, in physiology, biology, and chemistry, we see but its expressions? The organic expression of life is what interests us the most ; life as it manifests itself in temperament, in the shape of the teeth, their substance and history. The phenomena of life, as they relate to and influence organic formation, are what call for our careful study,—those subtle influences which alter nutrition, promote or retard assimilation and function ; those phenomena which, by virtue of accretion in organic matter, promote vital activity, or by their absence hasten dissolution and disintegration. While we do not disparage the old method of "judgment by exclusion," first practiced, we believe, in law, and then applied to medical practice, we encourage, above all, the careful cultivation of a habit of recognizing the causes which lie back of symptomatic manifestations, as the surest safeguard against the too common syndochical methods. No treat-

ment at all is better than wrong treatment, hence "where ignorance is bliss, 'tis folly to be wise."

The art of learning to await developments is not easily acquired, especially by the young practitioner, and we cannot too forcibly emphasize its importance. When in doubt or in the dark, let us wait, if possible, for the dawn; then, as the light of intelligence renders visible to the perceptions objects familiar and of interest, let us proceed with our surgery, therapeutics, or whatever may be needed, with more confidence, and a clear conscience.

Perhaps the more occult of the many problems in dental pathology, which we as dentists have to solve, are those embraced under the term neurological. Here we have nature as fickle as the imagination can conceive. To diagnose complex neuroses requires keen perception, and calm, careful decision. As students, we reverently bow to that higher power which has constituted and arranged this wonderful nervous complexity. We are in our elementary studies yet. We name the nervous currents afferent or efferent, centripetal or centrifugal; we speak of reflex influence, of organic inhibition, or in pathological parlance of the deroutation of nerve-currents, and of counter-irritation; but these terms, while useful, are primitive, unsatisfactory, and to the calm observer but slight aids in diagnosis,—the rounds of the diagnostic ladder. Here, however, let me speak of the second object which prompted the production of this paper,—viz, to emphasize the great necessity of a closer professional fellowship between the physician and dentist. In reflex odontalgia there are many cases which are beyond the province of the dental practitioner. A tooth-ache may be of visceral, aural, ocular, nasal, cerebral, or systemic origin, in which case the dentist, aye the patient, needs the physician; on the other hand, reflex neuroses may be of dental origin, and there are many and frequent cases of this kind where physician and patient need the dentist. Our dental dockets are full of memoranda recording the cure of strabismus, ptosis, diplopia, lagophthalmia, lachrymation, amaurosis, otalgia, trismus, tetanus, neuralgia, and scores of other reflex complications, by the proper treatment and filling or by the extraction of teeth.

Let us, then, as physicians, as dentists, as specialists, recognize this necessity of a closer professional communion, for we are but fellow-students in the path of mercy bent.

TRANSLATIONS.

ON THE DEVELOPMENT OF THE TEETH IN THE CHAMÆLEON.

BY CARL RÖSE, M.D.,

LECTURER ON DENTISTRY IN THE ANATOMICAL INSTITUTE AT FREIBURG I. B.

(Translated by R. HANITSCH, Ph.D., Demonstrator of Zoölogy in University College, Liverpool.)

I FIND no mention in literature of the development of the teeth of the Chamæleonidæ, nor of any other acrodont reptile. As the Chamæleon possesses multituberculate molars in the posterior portion of its

jaws, therefore the development of the teeth in this animal must be doubly interesting, especially with regard to the origin of molars generally.

I examined the heads and jaws of both young and adult animals. Unfortunately, I was unable to procure embryos of the *Chamæleon*. All the material was sectionized into series of 20 μ thickness, and doubly stained with alum carmine and bleu de Lyons. The figures have been drawn with Oberhäuser's camera.

Fig. 1 shows the teeth of the upper jaw five times magnified. The anterior teeth are unituberculate, the posterior ones bi- or trituberculate. All teeth are fused to the edge of the maxilla. *There is no shedding of teeth in the Chamæleon*, nor could I prove it to take place in *Hatteria*; but still there is, especially in the upper jaw, behind the

FIG. 1.

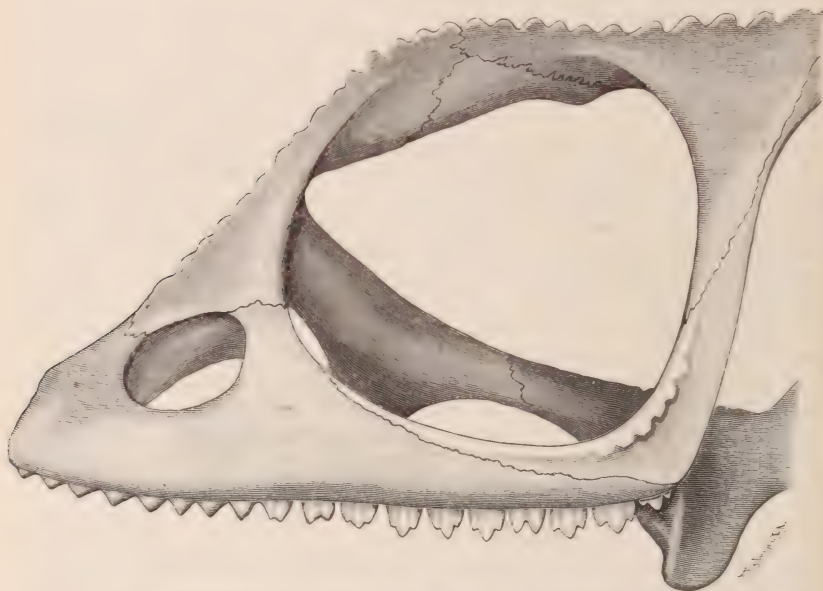


FIG. 1.—*Chamæleon vulgaris*. Teeth of the upper jaw. Only the two anterior of the three shells of the last molar are fused; the posterior one is still isolated. 5 diam.

functional teeth, a well-developed dental or reserve ridge. On its posterior end there takes place, throughout life, a continuous new formation of teeth. Accordingly, older animals have always a larger number of teeth than young ones. Although I examined macroscopically, with a lens, a number of heads of the *Chamæleon*, and microscopically six different series of sectionized jaws, I never succeeded in finding any indications of reserve teeth. The dental ridge showed indeed at its posterior end a slight depression (Fig. 2, *ZL*), but there was in its neighborhood no accumulation of mesodermal cells, found typically in true germs of teeth. For this reason, the slight thickening of the end of the dental ridge in Fig. 2 cannot be regarded as commencement of reserve teeth.

The point of fusion of the teeth with the jaw-bones is no longer

visible in the older front teeth, but can still be recognized in the younger molars. Fig. 3 gives a section through the antepenultimate tooth of the lower jaw of an adult animal. The odontoblasts of the dentine are continuous with the osteoblasts of the jaw-bone. We find a similar transition between dentine and bone. Along the boundary there is osteodentine,—*i.e.*, a tissue in which occur dentinal tubules and bone-cells. Some bone-cells possess abnormally long processes, which had for some time the function of forming the dentine and Tomes's fibers, but finally were entirely inclosed by basisubstance, and thus changed into bone-cells. It is scarcely possible to show the close relationship between dentine and bone more strikingly than in the acrodont reptiles.

FIG. 2.

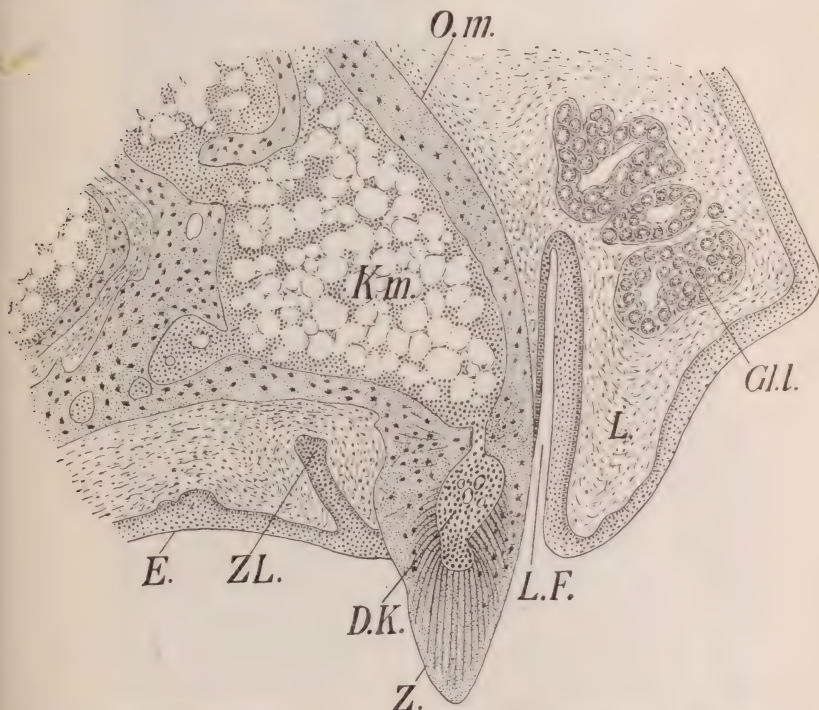


FIG. 2.—*Chamæleon vulgaris*, 22 cm. long. Frontal section through the upper jaw. Z, second tooth; DK, dentine germ; ZL, dental ridge; E, epithelium of the jaw; Km, bone-marrow; O.m., maxilla; L, lip; LF, labial furrow; G.l.l., labial gland. 50 diam.

Whilst the dental ridge, in the region of the functional anterior teeth, remains in continuous connection with the epithelium of the jaws, it loses this connection in the region of the developing posterior teeth, as is also the case in man. Fig. 4 gives a section in which the dental ridge has a broad connection with the enamel-organ of the developing tooth, and also with the epithelium of the jaw. In the next section that connection has already disappeared, and both the dental ridge and the developing tooth lie imbedded in the mesoderm, without any connection with the epithelium of the jaw. The ingrowth

of the dental ridge, marked *X*, may perhaps be explained as the last remains of a former series of teeth. On the posterior end of the developing teeth, now in process of calcification, the dental ridge continues growing as a free epithelial plate and grows laterally round the papillæ of the last molar. The multituberculate molars in the *Chamæleon* are developed exactly in the same manner as I proved for those of mammals. They arise from several papillæ, which, standing close together, become surrounded by the dental ridge. Fig. 5, *Pp*, shows two such papillæ.

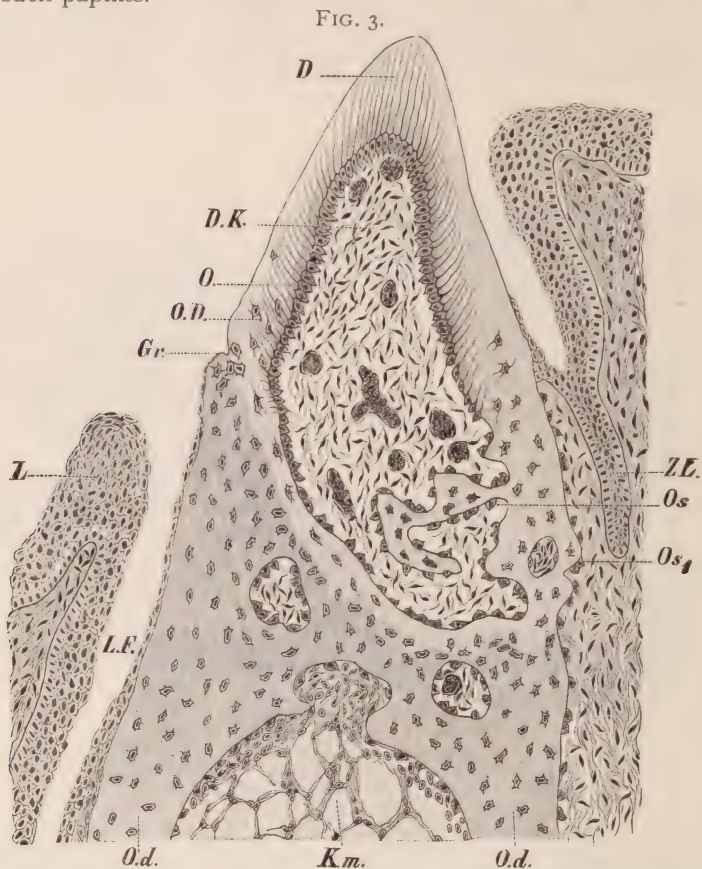


FIG. 3.—*Chamæleon vulgaris*, 22 cm. long. Frontal section through the lower jaw. *D*, dentine of the antepenultimate molar; *DK*, dental germ (pulp); *Km*, bone-marrow; *O*, odontoblasts; *Os*, osteoblasts of the bone-marrow; *Os₁*, osteoblasts of the periosteum; *O.d.*, *Os* dentale; *ZL*, dental ridge; *L*, lip; *LF*, labial furrow; *Gr*, boundary of fusion of tooth and bone. 100 diam.

The further development of the multituberculate molars could be studied exceedingly well in a young *Chamæleon* nine cm. in length. By accident, the direction of our section was not exactly frontal, but slightly slanting. Therefore as the three cusps of the molars lie sagittally behind one another, it happened that two of them were in the same section, and then could be seen plainly that the last molar of the lower jaw possessed three "shells" (or "caps"), still completely

separated from one another, but in the upper jaw the dental shells were already fused on their bases. Fig. 6 shows, to the left, the posterior end of the middle cusp; to the right, the anterior end of the posterior cusp. Both are still comparatively widely separated from each other. The high columnar cells of the inner, or true, enamel epithelium, cover only the individual dental shells, and are not fused with each other, as is the case with the closer-standing papillæ of

FIG. 4.

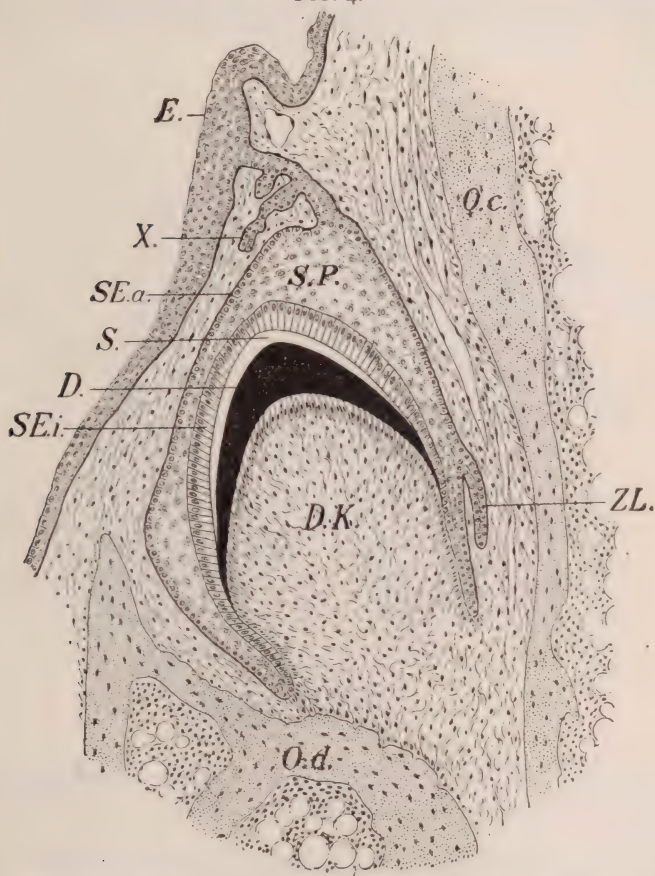


FIG. 4.—*Chamæleon vulgaris*, 22 cm. long. Frontal section through the (isolated) median cusp of the penultimate molar of the lower jaw. *DK*, dentine germ (pulp); *D*, dentine; *S*, enamel; *SP*, enamel pulp; *SEi*, inner enamel epithelium; *SEa*, outer enamel epithelium; *ZL*, dental ridge; *E*, epithelium of the jaw; *X*, ingrowth of the dental ridge; *O.d.*, Os dentale; *O.c.*, Os coronoideum. 80 diam.

the mammalian molars. Fig. 7 shows how, after fusion of the shells along their bases, the high covering enamel-cells become compressed.

All three dental shells in Fig. 6 are invested by a common enamel-organ, with a strongly developed enamel-pulp and external epithelium. The end of the dental ridge is only slightly constricted off from that enamel-organ. As soon as the three shells fuse with one another, the enamel-pulp and outer epithelium commence to degener-

ate. But the inner enamel epithelium remains functional for some time, until the formation of enamel has ceased. The enamel epithelium in Fig. 7 stops close to the lower end of the right dental shell. In some sections the fusion of the shells with the maxilla has already taken place more anteriorly. The fusion must naturally take place as soon as the closely allied tissues, dentine and bone, meet without a separating epithelial sheath.

I succeeded also in one case in showing macroscopically a stage in the *Chamæleon* in which only the two anterior dental shells of the last molar were fused, while the posterior one was still isolated (Fig. 1).

FIG. 5.

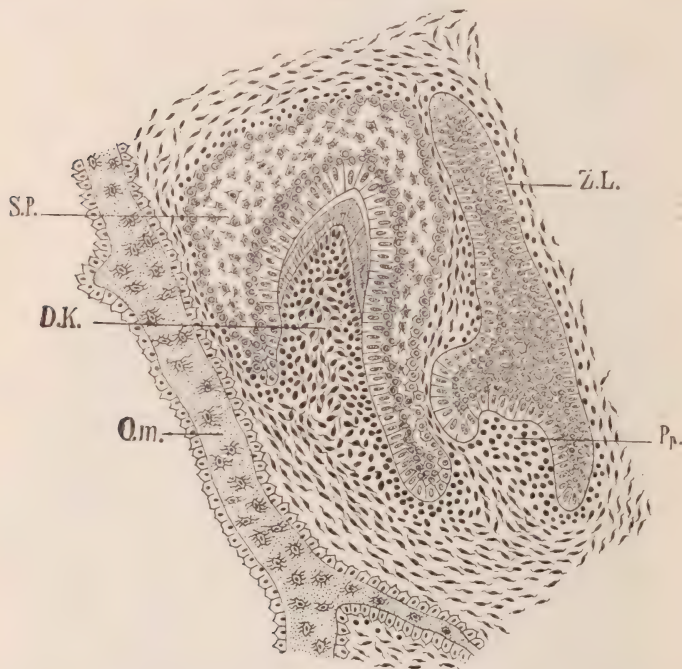


FIG. 5.—*Chamæleon vulgaris*, 22 cm. long. Posterior cusp of the penultimate and first indication of the last molar from the upper jaw. DK, dentine germ of the penultimate molar; SP, enamel pulp; O.m., maxilla; ZL, dental ridge; Pp, papillæ of the last developing molar. 160 diam.

The development of the teeth of the *Chamæleon* furnishes a striking proof of the theory that the molars are formed by coalescence, which I uphold, together with some other workers.

The essential character of a single tooth is that it be invested by the columnar cells of the inner enamel epithelium. This only furnishes the matrix which determines the form of the tooth. The form of the dental roots is partly determined by the inner enamel epithelium of the epithelial sheath. I have shown in various places that the dental ridge, with the enamel-organ developing from it, is nothing but a portion of the epithelium of the jaws which has grown down into the mesoderm. In most fishes and Amphibia, and also in Crocodilia, the first teeth are developed directly from the epithelium of the jaws,

exactly as the placoid scales of the Selachii. The dental ridge grows only secondarily downward. In crocodiles, can be observed most favorably how the primitive teeth of the first series are covered not only by the inner enamel epithelium, but also by several layers of epithelial cells, which are quite similar to the other cells of the rete Malpighii. It is only afterward, when the teeth are retracted into the interior of the mesoderm of the jaws, that the star-like cells of the enamel-pulp, and the external epithelium of the enamel-organ, develop from the polygonal cells of the rete Malpighii. The enamel epithelium, therefore, is quite homologous to the most superficial epi-

FIG. 6.

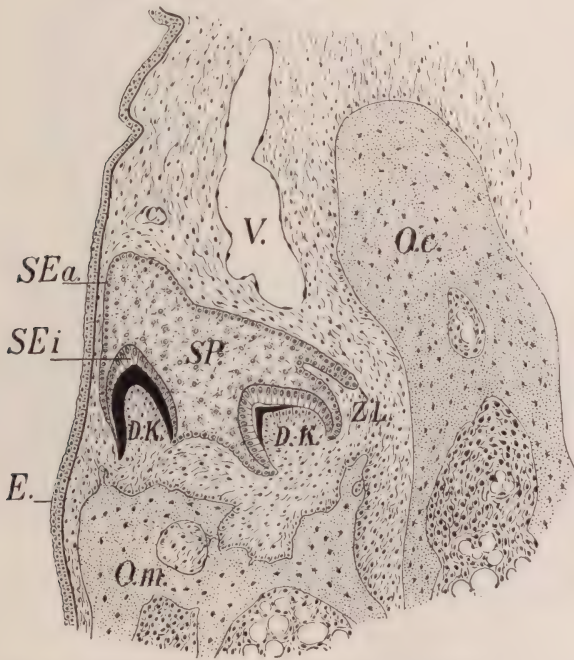


FIG. 6.—*Chamaeleon vulgaris*, 9 cm. long. Section through the middle and hinder cusp of the last molar of the lower jaw. *DK*, dentine germ; *SP*, enamel pulp; *ZL*, dental ridge; *SEa*, outer enamel epithelium; *SEi*, inner enamel epithelium; *E*, epithelium of the jaw; *O.m.*, Os dentale; *O.c.*, Os coronioideum; *V*, vein. 80 diam.

thelial cells of the mucous membrane of the jaws. There is no enamel-pulp among the Amphibia, because their teeth are too small. It can be proved very plainly on the dental plates of *Spelerpes*, that the developing teeth, in their first stages, are inclosed, partly by the dental ridge, partly by the epithelium of the jaw directly. All the teeth of this dental plate are fused on their bases by means of a cement socle. If we imagine that in the thus closely placed developing teeth of the dental plates of *Spelerpes* the enamel epithelium of several neighboring teeth fused and persisted thus for some time, then the teeth would coalesce with their dentine, and not only with their cement socles. The result would be compound teeth,

and such really occur among fishes and Dipnoi, although rarely. Why should similar phenomena not be recapitulated among the higher vertebrates?

In fact, we noticed above that the trituberculate molars of the *Chamæleon* arise ontogenetically, three typical enameled teeth becoming fused, sagittally from before backward. The three teeth are not of equal size, but the median one is higher and forms the protocone. If in the *Chamæleon* the epithelial sheath should grow further, so that thecodont teeth are formed, instead of the fusion of the teeth with

FIG. 7.

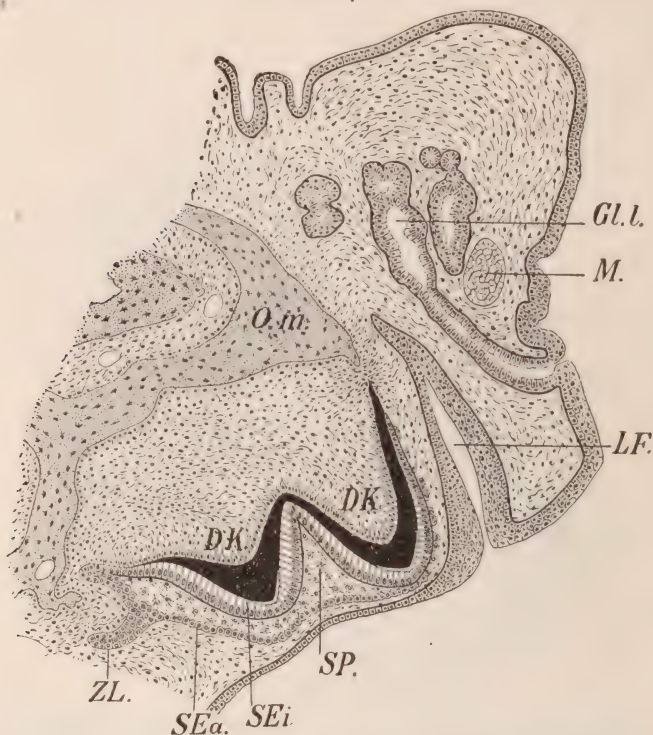


FIG. 7.—*Chamæleon vulgaris*, 9 cm. long. Section through the middle and hinder cusp of the last molar of the upper jaw. *DK*, dentine germ; *SP*, enamel pulp; *SEa*, outer enamel epithelium; *SEi*, inner enamel epithelium; *ZL*, dental ridge; *LF*, labial furrow; *GLL*, labial gland; *M*, muscle; *O.m.*, Os maxillare. 80 diam.

the jaw-bones taking place, then the posterior molars would, in form and size, greatly resemble the molars of the Mesozoic *Dromatherium*.

The theory of coalescence has found, so far, its greatest adversaries apparently among the paleontologists. Osborn reproaches me for having taken no notice of the Jurassic and Triassic mammals; but perhaps he is not quite justified in doing so. On the contrary, the study of the Mesozoic mammals has confirmed me in my views. If an unprejudiced person sees a molar of the *Triconodon*, he would certainly rather believe that in it three teeth are fused together than embrace the theory of transformation.

Dentists are familiar with the fact that even nowadays fusions of

teeth occur abnormally. For instance, the incisors of man often coalesce so intimately as to form one uniform tooth-structure. The formation of the root is quite a secondary process, and has nothing to do with the theory of coalescence. Indeed, this new theory is not convenient to the paleontologists. A large series of phenomena, which at present are regarded as well-established facts, have to be re-examined with respect to the theory of coalescence. Paleontologists, in their investigations, rely chiefly upon a careful study of the external shape of the fully-formed tooth. This is *one* way of ascertaining the truth, and the results obtained by such workers as Cope and Osborn show us what can be attained by it. If the fossils of the mammalian ancestors were present in an uninterrupted series, we could form from that our final conclusions. But we know how incomplete the paleontological records are. Imagination has free play at present, and fills up the gaps with more or less success. It is easy, then, to confound analogies with homologies, to confuse the secondary tubercles of teeth with the primary tubercles, especially when a worker starts with a prejudiced mind.

FIG. 8.

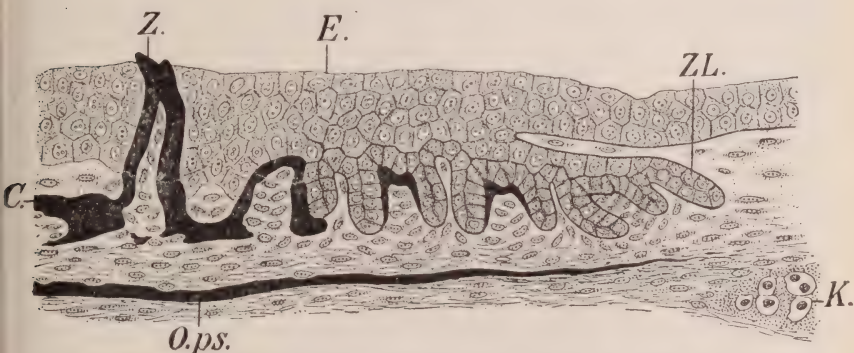


FIG. 8.—*Spelerpes (Geotriton) fuscus*. Sagittal section through the dental plate lying upon the parasphenoid. Z, fully-formed tooth; C, cement of the common dental plate; O.ps., parasphenoid; E, epithelium of the buccal cavity; ZL, end of the dental ridge; K, cartilage. 90 diam.

In such cases evolution is the safest test. Cope's trituberculate theory was a well-established scientific fact only from the moment when it was confirmed by evolution. Evolution gives us the proof that the molars of reptiles and mammals have arisen by the fusion of several unituberculate teeth. This is seen most plainly in the case of the simply constructed reptilian molars. The opposite view, that each molar develops by the transformation of a single unituberculate tooth, is purely arbitrary. A paleontologist or comparative anatomist, who judges only from the external shape of the fully-formed teeth, would probably have quoted this very dentition of the Chamæleon as proof for the theory of transformation. I willingly admit that in the molars of mammals various processes of transformation may have occurred besides the original coalescence. Not every small tubercle is homologous with a single tooth. But we should not forget to consider that, in the processes of fusion, all components need not be of the same size; larger single teeth may fuse with smaller and smallest teeth.

Of direct ancestors of the Chamæleonidæ we know only one species from the Eocene. But their dentition reminds us greatly of some Paleozoic reptiles. Galeosaurus planiceps, from the Karoo formation, has also trituberculate molars, and a monophyodont acrodont dentition occurs fairly frequently among the oldest known reptiles from the Permian strata. It is now a fact of the greatest importance that in the Chamæleon, and probably also in Hatteria, there exists, behind the functional teeth, a quite functionless but well-developed dental or reserve ridge. This proves that the ancestors of those animals had a secondary set of teeth.

Quite recently Busch (*Verh. d. Deutsch. Odont. Ges.*, Bd. iv, Heft 4) has argued that the change of teeth in mammals cannot be derived from that of the polyphyodont reptiles, as both the oldest known mammals from the Triassic and Jurassic and the oldest reptiles from the Permian are monophyodont. Busch therefore thinks he has to decide in favor of Flower's and Tomes's theory, according to which the milk dentition is a new acquisition of the mammals. That this theory is quite untenable has been proved by Kükenthal, Schlosser, myself, and recently also by Leche. The last author brings forward a view which cannot be lightly dismissed. According to him, it is only the milk dentition, or the first series of teeth, which is transmitted from the ancestors of the Mammalia, while the second, or permanent, series is a new acquisition. This last series of teeth is, among the Marsupialia, represented only by one newly formed tooth, the premolar, while there is a reserve ridge behind all the teeth. The second series of teeth of the Marsupialia is, according to Leche, not in regressive, but in progressive metamorphosis. Leche thinks it is especially improbable that, since the Jurassic period, the dental ridge should uselessly have persisted as a rudimentary organ. In the Chamæleon we have now a rudimentary reserve ridge which has probably persisted uselessly since the Paleozoic period.

Evolution gives us no clue as to whether the oldest Mammalia are descended from monophyodont Theromorpha, or whether, as I think, Mammalia and Theromorpha developed independently from older polyphyodont reptiles. The paleontology of the future has to solve this problem.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Concluded from page 652.)

SECOND DAY—*Continued.*

DR. E. L. CLIFFORD, of Chicago, read a paper, of which an abstract follows, entitled—

INFECTION FROM THE MOUTH.

Each and every day brings the thoughtful student more and more to face the fact that the scientific world is progressing, and he who has kept *au courant* with the literature of medicine must acknowl-

edge that the results of such investigations as are now being pursued have for a principal object the unfolding of the principal factors in the causation of diseases, with a view to their prevention.

Investigation and experimentation in the past have been unable to specify and establish any *single* thing as a final cause of disease, and it has been said by one, eminent in our current literature, that he knew of no disease which acknowledged a *single* cause. Our work, then, if this be true, must be to search for and find out the many and ever-varying factors, or conditions which, as antecedents, combine to produce disease; and I am of the opinion that to the physiological agencies within our bodies during life we will find many competent factors. The researches and expositions of Gautier, Peter, Brown, and Brunton confirm our belief in the poisoning or intoxication of the animal economy with its own products. These eminent physiological chemists traced and pursued their investigations from the general aspects, and Aitken in his excellent review of their work has classified them under two heads: First, from a chemical and physiological or bio-chemical standpoint; and second, a clinical or pathological. From the first standpoint, the fact was established that in dead animal tissues, processes of putrefactive decomposition set in, by which certain alkaloids are elaborated from the proteid substances, and these alkaloids were designated by the late Selmi, of Bologna, as "ptomaines." Gautier, however, further showed that in the *living* animal tissues, and that by virtue of their vitality, certain other alkaloids are elaborated, which are analogous to the ptomaines, and these he has named "leucomaines." But, still further, he has demonstrated that in the living animal economy there are elaborated certain azotized uncrystallizable substances, which are as yet undetermined, and which he has called "extractives," or "extractive matters," and which Aitken states are quite as unknown as the x , y , z 's of an algebraic formula. The nature of these extractives, then, remains a mystery; but this much we are told of them, that while we are assured that the ptomaines are toxic, and that the leucomaines are also toxic, these unknown extractives are more toxic or poisonous to the system than either. Different alkaloids have been obtained from different sources, both animal and vegetable, and as long ago as 1820 Kerner pointed out the resemblance between the symptoms of poisoning by the animal and the vegetable alkaloids. Experimentation has since confirmed the theory. Zuelzer and Sonnenschein obtained both from macerated dead bodies and from putrid-meat infusions, small quantities of a crystallizable substance which exhibited the reactions of an alkaloid, and had a physiological reaction like atropin, dilating the pupil, paralyzing the muscular fibers of the intestines, and increasing the rapidity of the pulse. V. Aurep obtained an alkaloid from poisonous fish and Vaughan an alkaloid from poisonous cheese, but "Gautier, Etard, Brieger, and others have given precision to the data previously acquired and added largely to the varied and careful examinations of cadaveric tissues." "They forced the conclusion that during putrefaction of nitrogenous animal material there are formed organic bases, fixed or volatile, presenting for their chemical and physiological properties the closest similitude to the vegetable alkaloids."

In fact, while it was at first supposed that these animal alkaloids

differed in their nature from the organic alkaloids formed by vegetables, and various reactions had been given to distinguish them, Brieger appears to show that the distinction can be maintained no longer, but that the animal and the vegetable alkaloids are similar in their chemical constitution, that they are both products of albuminous proteid decompositions, and that some, at least, of the so-called ptomaines are identical with vegetable alkaloids. Hence, Dr. Brunton seems justified in regarding alkaloids "as products of albuminous decomposition, whether their albuminous precursor be contained in the cells of plants and altered during the process of growth, or whether the albuminous substances undergo decomposition outside or inside the animal body, or by processes of digestion, as by organized ferments." Aitken also states that it has been shown that the alkaloidal products formed by the putrefaction of albuminous substances vary according to the stage of decay at which they are produced. At first the poisonous action of the ptomaines may be slight, but as decomposition advances the poisons become more virulent, while after a still longer period they become more broken up and lose to a greater extent their poisonous power (Brunton). "In addition to these alkaloids obtained by Brieger, a number of poisons have been got by other workers from decomposing articles of food, or from dead bodies, and even from portions of healthy animal bodies; and although these may not have been obtained in the same state of purity, not have had their chemical constituents so well defined as Brieger's, they are still as unknown extractives, x, y, z's, of great interest and importance."

Experimentation has even shown that the primary products of albuminous decomposition of digestive ferments, such as peptones, are poisonous, and that pepsin will split up albuminous substances still further; and Dr. Brunton very aptly sounds the tocsin of caution against the extreme and indiscriminate use of the various digestive ferments, and of the many varied artificially digested foods which have now become common. Consequently it behooves us to study the products of albuminous decompositions as a matter of much practical importance, not only as regards pathology, but as regards therapeutics. Now it may not be possible to exclude these animal alkaloids from the general economy, for Gautier has proven that they are a necessary product of *vital physiological processes*.

His experiments show "that about four-fifths of our dissimilations are the result of transformations within the body, comparable to the oxidation of alcohol," and that the remaining one-fifth of the dissimilations are formed at the expense of the living tissues themselves, "free of all demands on foreign oxygen." In other words, "a fifth part of our tissues live after the manner of ferments,—that is, they are anaërobious or putrefactive as to their life." "Hence the possibility of alkaloids being thus formed within the living organism, independently of bacterial fermentation, is quite within our conception."

Bio-chemically the same author states that much has been proven, and he does not doubt that poisonous alkaloids are continuously formed in healthy men and animals by the decomposition of albumen in the intestinal canal, during the process of digestion, or in the blood and tissues generally by the metabolism which occurs during the functional activities of life. He believes that a considerable pro-

duction of alkaloids takes place in the intestines when the digestive processes are normal, and more especially when they are disordered. Were all the alkaloids to remain within the body, poisoning would undoubtedly ensue, and Bouchard makes the statement that the alkaloids formed in the intestines of a healthy man in twenty-four hours would be sufficient to kill him if they were all absorbed and secretion stopped. Another statement made by the same author tends to show the power of these agents as an etiological factor, and which at this time will probably not be questioned, "that the nervous disturbance which occurs in cases of dyspepsia is due to poisoning by ptomaines;" "that they augment notably in the course of certain maladies,—in typhoid fever, for instance."

Now, as to the clinical, pathological, and practical aspects, according to the different sources of poisoning, or intoxication, as it is technically called, there are correspondingly different indications, signs, or symptoms, which Dr. Brown classifies as follows: (1) Poisoning by the extractives is attended by hyperthermia; (2) poisoning by "animal alkaloids" is accompanied by hypothermia; (3) a combination or succession of hyperthermic and hypothermic phenomena may become manifest according to the combination or alternation of poisoning by the deleterious physiological products, or their antagonistic action. Some contradictory evidences of the above are accounted for as follows: "Where 'extractive matters' accumulate in the blood, we detect hyperthermia; on the other hand, if 'alkaloids' accumulate, we have hypothermia; while if the two factors co-exist they may neutralize each other, or become antagonistic in their action, so that temperature may remain stationary or normal. But should one or the other predominate, immediately the scale is turned, so that some variation may be noted. In this auto-infection, this spontaneous or self-infection, of the living organism by the alkaloids and extractives of its own formation there is no question of quality, but simply one of quantity, to be considered, by reason of the essential physiological source and action of the poison. In other words, the healthy living organism may become poisoned (more or less slowly) by the accumulation within itself of deleterious substances normally elaborated, but imperfectly or defectively eliminated. Hence the slow and insidious onset of much ill health, and from which recovery is correspondingly slow." Now, in what way does this auto-infection of the system take place? Brown tells us that it can only be understood and explained by the mode in which we regard the phenomena of life. Life is a ceaseless decay with a ceaseless repair. "Normal health is conditioned on an incessant formation, transformation, and elimination of the effete or old organic materials, which must give place to new. It is this effete material which, therefore, represents a series of partial deaths, and which, as the result of organic functional operations, constitutes life, during which the tissues and organs, in the processes of their metabolic changes, perform a constant function of disintegration, fabricating during these processes those alkaloids and extractives—those x, y, z's of pathology—which must be regarded as veritable 'physiological ashes' (Brunton), resulting from the processes of combustion of the elements of organic tissues."

Having progressed thus far, and, we think, established the fact of

the presence and power of these poisonous agents, let us for a while cast a glance at the oral cavity of man and see if any conclusions can be drawn as to the part it plays in promoting or preventing the formation of these factors in the causation of disease.

First, we will claim that no portion of the organism is of more importance, or is more active as a veritable chemical laboratory, than the mouth. It is established that in the processes of putrefactive decomposition certain alkaloids are elaborated from the proteid substances. We all know that in the cleanest mouths certain portions of these proteid substances will remain as they are ingested with the food we take, as well as the water we drink and the air we breathe. We know also that in the cleanest and healthiest mouths absence of bacteriological influences is but an utter impossibility, and that these micro-organic agencies, furnished as they are with the proper media or food, conjoined with a suitable temperature and abundant moisture, make the mouth one of the best incubators that can be imagined. If this be so in mouths that have been no strangers to proper hygienic influences, how much more strongly is the fact established of the influence of this territory where carelessness and neglect have been a predominant feature? And, if we accept the theory of Aitken that these alkaloidal products vary as to their poisoning power according to the stage of decay at which they are produced, how important is it that these hygienic influences be enjoined and enforced. Then, again, accepting the dictum of Gautier, that these animal alkaloids cannot be excluded from the general economy, and that they are even necessary as a product of vital physiological processes, it certainly becomes the duty of that branch of medical science to which the very entrance of the digestive tract is allotted for control and treatment to see to it that contaminating influences are eliminated. Again, if the possibility of the formation of these animal alkaloids is acknowledged without the aid of bacteriological fermentation, as shown by Gautier, how much more deleterious must be their effects and how much greater must be their production when conjoined to and assisted by these physiological agencies. If an abnormal amount of these poisonous substances is produced within the intestines when in any way disordered, how much more reasonable to conceive that the manufacturing capacity of the mouth is greatly increased when a condition that might be termed absolute filth is no stranger to the eye of the observant dental practitioner. If the amount of these agencies formed in the intestines of a healthy man in twenty-four hours is sufficient to kill him if absorbed and secretion stopped, it will require no great stretch of imagination to realize that enough poison could be taken from the mouth of the average dental patient to kill a small army of inoculated subjects if properly applied. Let the physician who doubts this statement recall the condition of wounds, and ponder over the difficulties of his prognosis when called to attend a traumatism caused by the human bite. The conclusions of Dr. Brunton will also go far to account for the thermal changes which take place and accompany these traumatisms when viewed from a clinical or pathological standpoint. Neither establishes well the part played by the human mouth as a generator of micro-organic life, and his testimony is corroborated by other investigators. Not only are large quantities of the animal

alkaloids produced within the intestines and other portions of the alimentary tract, but large quantities are swallowed with innumerable bacteria which have already been produced in the mouth, and, as stated by Miller, they give rise to local and general disorders of the most serious nature, produced partly by the direct action of the micro-organisms and their products upon the teeth and the mucous membrane of the mouth, partly by swallowing large portions of bacteria, partly by carrying them into the lungs, particularly in cases of violent inspiration, and finally by their obtaining an entrance into the blood or lymph-vessels in various ways, such as by a breach in the continuity of the mucous membrane, brought about by mechanical injuries (wounds, extractives, etc.) through the medium of gangrenous tooth-pulps, which usually lead to abscess at the point of infection, sometimes with secondary septicemia and pyemia, with fatal termination by resorption of poisonous waste products formed by bacteria, by the inspiration of particles of slime, small pieces of tartar, etc., containing bacteria, and by contact with the oral and pharyngeal cavities, whose power of resistance has been impaired by debilitating diseases, mechanical injuries, etc. The very ante-chamber of man's vegetative existence, the very portal of the human body, furnishing as it does a most excellent nursery for these etiological factors, has not received from the general profession of medicine, within the past, that attention which its importance has deserved; but, thanks to the work and investigations of some of the members of our specialty, the physician can no longer ignore these factors and feel that he has done justice to himself and the patient who has so confidently placed himself under his care. The results of the last few years have proven that if many of the diseases whose origin is enveloped in mystery could be traced to their source, they could be found to have originated within the oral cavity. And, as to the danger of such diseases as do follow from infection traced directly to the mouth, it seems there could be but one thought when we reflect that out of a carefully prepared table of one hundred and forty-nine cases by Miller, there resulted fifty deaths, nineteen cases of syphilis, two cases of blindness, and two cases of a loss of a part or the whole of one of the maxillæ.

Most of the work which has been done up to this time (with the exception of that done by Miller) has been with a view of attracting the attention of the dental specialist to infection which has been carried into the mouth from without, resulting in local manifestations which would naturally come under the supervision and treatment of the dentist. Miller has opened up and is cultivating with skill and determination a new field of research, and it seems to be his object, as it is mine at this time, to attract the attention of the general practitioner to infections which are carried from the mouth and are planted in such soils as will prove favorable to their future germination and growth, hence proving an obstacle in the path of him who would assume to treat these pathological lesions without due appreciation of the important part these agencies and this location play as factors in etiology. It would not be difficult to convince the observant dentist of the truths here implied; it would only be necessary, were that our object, to ask him to recall from his every-day experience ample facts to substantiate the position. He has seen many times

the general health of his patients vastly improved by a proper care of and attention to the mouth. He has studied, as a specialist, the chemical powers of decayed teeth, vitiated and poisoned secretions, and fully appreciates their power and influence; but I am forced to the belief that the physician of the past has either wilfully or ignorantly ignored the important part that this portal plays in the aggravation of diseases, or as a preventive of cure. And this thought is only enhanced and enlarged by the recent practices of the more observant and faithful in calling to their assistance the aid of the competent orist in the effort to re establish physiological perfection.

To make the attempt to enumerate and to classify the different ailments which are either caused or aggravated by the unhealthy and unwholesome condition of the mouth would be too great a task for one paper, if it were necessary,—but it is not. Miller has done and is doing this work for us, and it is our province to assist as much as possible in bringing to the notice of the profession the excellence of his work and the importance of his conclusions. Every physician of experience has often, no doubt, found himself facing the difficulty of not being able to account for the cause of many cases in practice; and while I would not have him look to the mouth as the harbinger of all these causes, I would ask his attention to that sphere as a possible, and I might say a probable, source in many cases.

There is no doubt that the nervous system, in many instances and by very remote manifestations, is often injured to an alarming extent by the mechanical or chemical irritation emanating from an oral organ. The alimentary tract, we know, is often deprived of the privilege of doing its proper duty by contaminations implanted in the first bolus of food started on its course through a filthy and poisonous mouth, and added to the chemical contamination may well be mentioned the mechanical, which, in cases of mal-occlusion, tender and sore teeth, or edentulous mouths, prevent a proper mastication of food, entailing upon the stomach an office and a duty never designed by nature. This overwork of the stomach, combined, as it often is, with the chemical poisons of the diseased mouth, of course is sufficient to interrupt the proper function of other organs in the track as they are reached, and consequently the whole canal becomes a source of irritation and of poison. Now, of course, the primary source of health and growth being so far drawn from the path of rectitude laid out to furnish man with ease and not disease, it is evident that future digestion, assimilation, and nutrition is a matter of impossibility. If the ptomaines, leucomaines, and extractives are found in every organism and under all conditions, it is only rational to believe that an all-wise Providence has designed them for a specific and for a physiological purpose. They have a function to perform, even though it be only that of scavengers for other tissues. It would certainly not be wise to place a minor importance upon the function of the kidneys simply because their principal office seems to be that of eliminators; on the contrary, the more reason why their integrity should be preserved and their powers not deteriorated, in order that those substances which seek this channel may be thrown off, and not left to accumulate to contaminate and to poison what would otherwise remain healthy.

Likewise, if micro-organisms are so universally present, the same

facts would equally apply to them, and it is to the prevention of a growth of an abnormal quantity, and to the prevention of the introduction into the organism of specific germs, that the attention of the therapist of the future will be more particularly directed. If we could only get our medical *confrères* to pay more attention to the chairs of oral and dental pathology that have lately been introduced into our colleges, to the sections on these subjects that have been attached to all the congresses and national associations of late years, we believe they would more fully appreciate their importance, would more often seek the advice and assistance of the specialist, and this in turn would create a bond of union between us and them, stronger and better appreciated than any which has existed up to this time.

Aside from local inoculations and their results, which are usually classed among dental diseases, there are many forms of aberrations for which the condition of the mouth may be held responsible, especially paralyses, pareses, anesthetics, and hyperesthesias possibly adorn the border-line where it is difficult to determine whether the case is one for the specialist or the general practitioner; but these lesions having long been noticed as doubtful in their etiology, are not classed among the obscure, and are often brought to the notice of the specialist and his assistance sought. But in those more obscure cases where the cause is greatly clouded, mistakes are more liable to occur, and the physician often battles in his efforts to restore a healthy status by the ever-interfering and constantly infecting products of this portal to man's existence. Miller has shown that pulmonary and bronchial diseases are excited or aggravated by the inspiration of germs from the oral cavity, as evidenced in the case cited of J. Israel, where primary actinomycotic infection followed the lodgment of a small piece of infected tartar within the lung. Several cases within my own practice confirmed the theory, and I have more than once seen the benefit and been able to bring it forcibly to the notice of the attending physician, where marked improvement followed the sterilization of the mouth, where efforts had proved fruitless prior to this step. Alimentary disorders are of such common occurrence, as a result of defective and contaminating mastication, as to require no extended notice, and from this one condition all other organs are more or less affected, both nervous and vascular. Bednar, said to be the first to give clear expression to this view, in 1854, states that "indigestion may be brought about *directly* by taking into the stomach any substance already in a state of fermentation; *indirectly*, when the food taken into the stomach undergoes subsequent fermentation on account of its disproportion of the gastric juices." Henrock favored this conception, and found in it a cause for a large number of diarrhœas, while Minkowski classifies under five heads the disturbances directly caused by the fermentative processes in the stomach:

1. Substances may be formed which irritate the mucous membrane of the stomach and bring about a state of catarrhal inflammation.
2. Considerable quantities of gas may be found heightening the mechanical insufficiency of the stomach.
3. Fermentations may lead to the production of substances having toxic properties.
4. In the fermentation of albuminous substances, alkaline products may arise which neutralize the gastric juice.

5. The gastric fermentations may exert a great influence on the functions of the intestines.

And now, what is our lesson? We would ask the general practitioner to regard the unhealthy condition of the oral cavity, with all of its contents, as an important factor in the causation or aggravation of diseases, having shown, as we believe, that within its boundaries lie the primary causes of many pathological lesions; that good, healthy, clean, and serviceable dental organs are absolutely essential to the enjoyment of physiological ease; and that in many cases the dental specialist has it within his power to render valuable assistance in the search for this result.

Discussion.

Dr. J. S. Marshall said that the paper opened up a field of thought to all of us as dentists, and the application made to the diseases of the general system will make it valuable to the general practitioner. Almost every pathogenic micro-organism has been found in the mouth by Dr. Miller, and we cannot be too careful about introducing them into our own system when operating. Upon two occasions he had pricked his finger while at work, and each time had had troublesome sores from the accidents, showing that there was more than a mere wound to deal with.

Dr. Talbot said there were, no doubt, many cases where a foul condition of the mouth was responsible for troubles in the general system, and where an improvement in health and increase in weight had followed the putting in order of the mouth. The infection from the mouth of a patient, too, had often caused trouble to the dentist, such as inflammation of the eyes, and perhaps sore throat, consumption, and tonsillitis.

Dr. Taft said we should promote the functions of the eliminative organs; the skin should be kept clean, the liver active, the kidneys, lungs, etc., in good condition, and then there will be less likelihood of infection from these bacteria. Care should be taken to regulate the food-supply as to quantity, quality, and the proper preparation; these precautions, with reasonable effort toward keeping the mouth clean, will be sufficient to guard against these infections. He also spoke of the habit of mouth-breathing, and said dentists should impress on all their patients the necessity of keeping the mouth closed.

Dr. Clifford said that the main idea in his paper was to call attention to the effect that the micro-organisms of the mouth had upon the general condition. Dr. Taft spoke of keeping the eliminating organs in good condition; but this cannot be done unless the mouth is kept clean, for if the mouth contains enough poison to keep the blood, liver, and skin in bad order, they cannot be got right until the mouth is rid of the cause of the trouble.

Dr. M. H. Fletcher read a paper entitled,

SOME SUGGESTIONS AS TO THE RELATION OF THE TEETH TO EMPYEMA OF THE MAXILLARY SINUS.

In this paper the anatomy, pathology, and treatment as usually given by authors on disease of the antrum of Highmore will be largely omitted, since the disease of this cavity is a subject much written

upon, and consequently these points must be familiar to all who have given the subject any considerable attention. It is desired, however, to deal principally with the etiology, believing that if the cause of the disease is correctly diagnosed, the treatment is comparatively easy.

Authors and practitioners seem to be divided into two classes,—viz, those who believe that diseases of the maxillary sinus are most frequently caused by dental lesions, and those who believe that they are more largely due to intranasal disorders. The latter view is held by Zuckerkandl, Schiffert, Krause, and Bosworth.

Those who look more largely to the teeth as a source of trouble are Lewis, Baratoux, Noquet, Boucheron, Garel, Gele, Beverly Robinson, Lennox Browne, Garretson, and Tiffany. In the "American System of Dentistry" (page 562), Tiffany says in regard to disease of the antrum, "It is not met with as an idiopathic affection; it occurs as the result of injury, and as an extension from a diseased tooth. The first and second molars are the most likely to act as the inciting causes, as their fangs *project into the floor of the antrum.*"

In treating of the diseases of the antrum, Lennox Browne says, "The cause is almost invariably an alveolar abscess, which has extended into the antrum through a natural connection with that cavity, as in the case of the first molar tooth, or breaking down of the slight bony partition in the case of some of the other upper teeth." Bryant in his last edition says, "Suppuration of this cavity is often due, doubtless, to the extension of inflammation from the teeth." These quotations are a fair sample of the words of most of those men who claim that antral troubles come largely from the teeth, and it would seem that they copy largely one from another. This I deem to be a defect in many of our text-books. Many men copy from previous writers or write *for* experience instead of *from* experience, thus leaving us without additional knowledge.

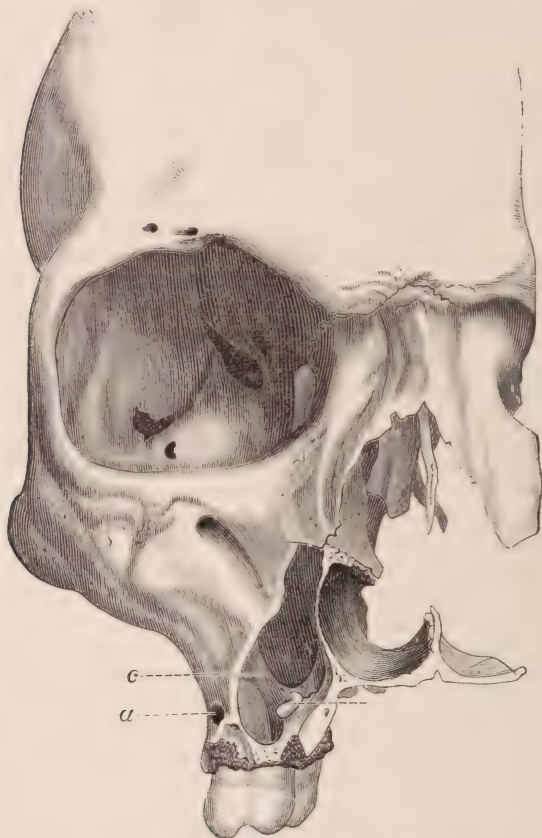
Those writers of contrary opinion cite many pathological conditions of the intranasal tissues as the more frequent cause. Among these causes are new growths, catarrhal inflammation, acute and chronic, and stenosis of the osteum maxillare.

It is not proposed to go largely into the etiology of the intranasal troubles, but give attention more especially to the claims of those who blame the teeth for these disorders. The writer's views coincide with those of Zuckerkandl, Schiffert, and others who believe these antral troubles are more largely caused by intranasal disorders, and I wish herewith to present evidence for such an opinion.

This opinion has been arrived at after some years of experience, in addition to the examination of *one hundred skulls*. These skulls were examined with special reference to the relation of diseases of the teeth to the antrum. It is known that the anatomy of the antra of the superior maxillary bones and their nervous supply is such that there can be no disease by reflex action from one to the other as occurs in sympathetic ophthalmia, consequently these cavities are dealt with as separate organs. The statistics then would show two hundred antra instead of one hundred. These skulls were examined for five particular points, viz, First, for abscessed teeth; second, for septa; third, for conical protrusion of the roots of the teeth into the antrum; fourth, for perforation by the roots of the teeth without protrusion; fifth, for perforation of the antrum from ulcerated teeth.

First. As to abscessed teeth and the connection of such abscesses with the antrum. Only such teeth are mentioned as might most easily produce antral troubles, viz, the three upper molars; the bicuspid and cuspid being too far forward to be counted in these statistics. I might say, however, that in a number of these skulls evidence of ulceration was found in the bicuspid and cuspid, with no apparent connection whatever with the antra, save in one case. As to the

FIG. 1.



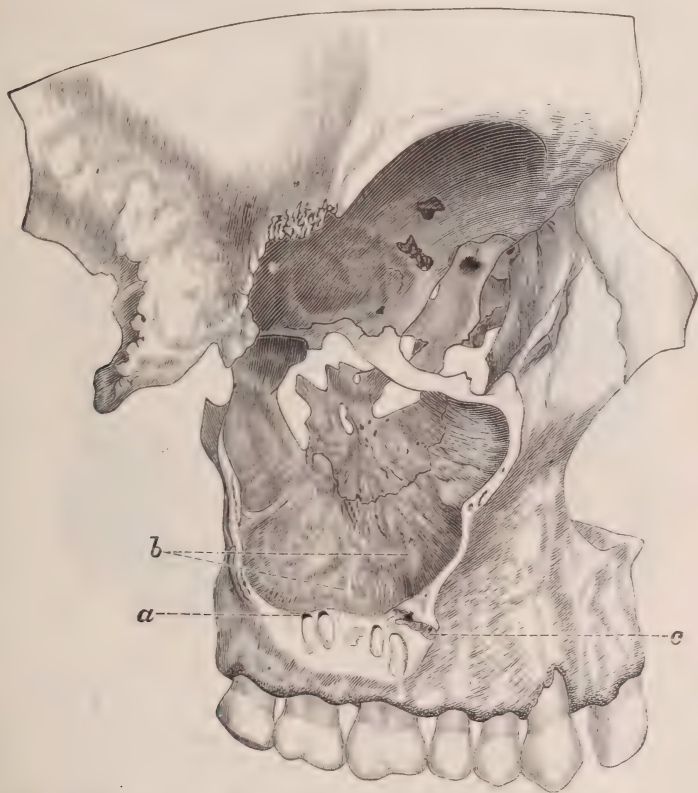
molars, ulceration was found in more than twenty-five per cent. of the skulls, there being in these two hundred examinations, fifty-seven ulcerated teeth, and out of these *fifty-seven possible* cases of perforation by inflammation and its results, we found such to be the case *only four times*, all other cases having perforated the alveolar border and discharged the pus into the mouth, two of them discharging both in the mouth and in the antrum, as is evidenced by the specimen No. 1 (see Fig. 1, *a*)* which I will pass about for your inspection. This

* It is so difficult to reproduce these sections by cuts that the specimens themselves must be seen in order to thoroughly comprehend many of the points referred to in the paper.—M. H. F.

does not show a very large proportion of cases where antral trouble has come from the teeth, being less than eight per cent in fifty-seven possible cases.

In addition to these figures I wish to offer as negative evidence statistics from my own records in regard to the relation of these diseases of the teeth to the antrum, as they have come under my daily observation. I have in the past ten years treated 916 cases of pulpless teeth, 224 of these being superior molars, which, according to the authors named above, could and probably would have caused

FIG. 2.



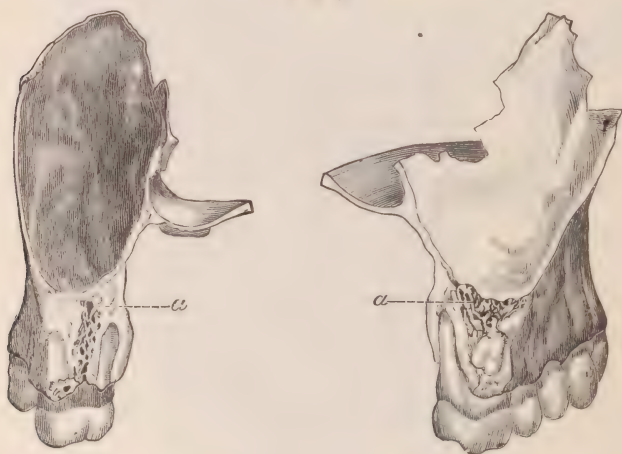
inflammation or pus in the antrum of Highmore. Out of this number from my own records only one had pus in the antrum as far as I could tell; and this is the only marked and certain case of empyema of the maxillary sinus caused by the teeth that I have seen.

I have, on the other hand, treated a case in which the teeth were made pulpless, and some of them lost in consequence of disease of the antrum; and this I believe to be a condition more frequently brought about than the reverse, from the fact that some of the teeth (in the skulls examined) perforated the floor of the antrum with no protuberance, septa, or other covering save that of the mucous membrane. Specimens of these I will pass about for your inspection (see Fig. 2, a).

Such perforation I have found in eight cases, which number I believe to be smaller than it should be could all cases have been thoroughly examined for minute openings. It must be evident that the mucous membrane covering the apices of such teeth, if diseased, could easily cause the death of a tooth by destruction of its blood and nerve supply, which, in its turn, would produce a dental abscess or inflammation about the roots of the teeth, thus producing a difficult case to diagnose. The probabilities are that such diseased teeth having been found connected with the antrum, the teeth have *improperly* borne the blame. In order that these cases can be properly diagnosed, they must needs be examined by one thoroughly familiar with alveolar abscesses and the causes leading thereto, which I claim very few persons can do who are not experienced dental practitioners of acute and accurate observation.

It would seem that these teeth whose roots *perforate the antrum*, where there is usually *neither septa nor protuberance* over the roots of

FIG. 3.



the teeth, are more likely to cause the trouble in question than those which show the tubercle above the roots. This protuberance in question (pictured by Zuckerkandl, and copied by Bosworth, photographs of which cut I show you, see Fig. 4) seems to be the prevailing idea of the relation of the teeth to the floor of the antrum, but which from my own observation is quite erroneous. never having seen but one case which approaches this condition. This skull I pass about for your inspection (see Fig. 1). You can readily see these tubercles are not in the center of the floor, nor in direct line, nor is the floor flat for their reception as Zuckerkandl's picture shows it (see Fig. 4); consequently his illustration is evidently ideal or exceptional rather than true to nature. It would seem the rational thing, if we are to treat diseases successfully, to first know the anatomy of the parts, then we have the true foundation upon which to build our idea of the pathology. These two points being founded on the truth, our treatment is comparatively easy, whereas if we proceed on an improper conception of the anatomy of a part we are endeavoring to treat imaginary things,

and it is only through nature's kindness that our patients recover, for nature follows unchangeable laws.

Some further observations made in regard to the floor of the antrum are as follows: In about twenty-five per cent. of the cases examined small septa or ridges were found to cross the antrum, as shown by this specimen which I pass about (see Fig. 2). These ridges you will observe have no relation to the position of the roots of the teeth, although in some cases they were found to come directly over the roots in place of the tubercle, as pictured by Zuckerkandl.

Evidence can be presented to show that abscessed teeth probably do not often break into the antrum nor cause frequent trouble there, by taking into consideration the amount of cancellous tissues found about and above the roots of the molars in almost every case.

By examination of this section (see Fig. 3, *a*) it will be observed that the diploë or cancellous bone about the roots of the teeth affords quite ample space for the products of considerable inflammation. These spaces being filled with soft tissues, like marrow, easily take on inflammation, and the products of inflammation may largely displace them. Again, when we have inflammation in this cancellous tissue and about the apex of the root, we have the periodontal membrane largely involved. This of itself gives way, as is evidenced by the lengthening of the tooth, and the products of inflammation may easily push down the side of a root and also easily perforate the alveolar process. The alveolar process on the buccal surface over the roots of the teeth being very thin, of course would be quickly perforated, and in many cases the upper parts of the roots are simply covered with soft tissues and no bone; whereas the floor of the antrum is usually thicker and of a dense, horny character, and is also held more firmly in position by the cancellous bone growing from its underside, consequently it would not be perforated as quickly as the alveolar process. It also seems in these cases that the periodontal membrane is very largely affected, which is evidenced by an examination of the sockets and bone where there has been an alveolar abscess. This is readily seen in specimen one (Fig. 1), which you have already examined for another point. This specimen shows the evidence of a perforation in three separate places,—one for each separate root of the superior molar, the two buccal roots having discharged the products of their inflammation in the mouth and the palatal root opening into the antrum at the apex of the tubercle (see Fig. 1, *a*). This antrum also has a more distinct septum than most that were examined (see Fig. 1, *c*), although I found four or five septa that were even larger than this.

I found one case of which I especially wish to speak, and which has already been mentioned (skull No. 81). It had evidence of the worst trouble I found from alveolar abscess. In this case the roots of the cuspid, first and second bicuspid, and palatal roots of the first molar were involved. A cavity had formed reaching from the lateral back to the first molar, and from the alveolar border to the summit of the canine fossa, measuring about an inch in diameter.

A septum seemed to have formed, or had already been formed, between this cavity and the antrum, completely isolating the antrum from any connection with the trouble, although the palatal root of the first molar was involved; yet there seemed to have been no connec-

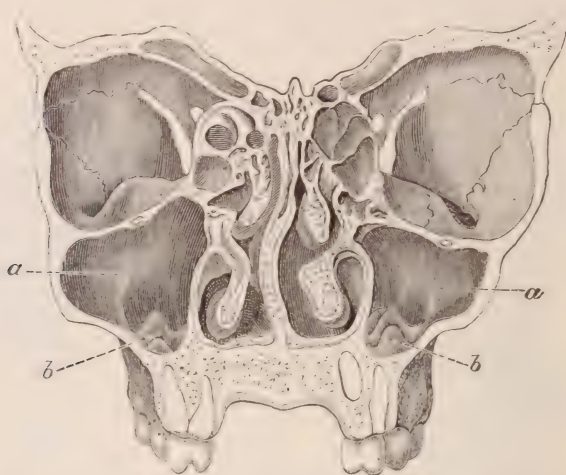
tion of the disease between this tooth and the antrum, although the floor of the antrum could easily have been perforated through the socket of the buccal roots. If there was a discharge from this molar at all it showed no evidence in the antrum, but did show evidence in this external and anterior cavity, which seemed to have been the result of chronic inflammation and collection of pus.

In regard to the proper place to perforate the antrum when demanded. After taking the anatomy of the parts into consideration, it would seem that for several reasons the opening should be made between the apices of the second bicuspid and first molar. (See Fig. 2, *c*.)

First. Because this locality is the most accessible.

Second. A perforation here does not interfere with the blood or nerve supply of either tooth.

FIG. 4.



Third. By raising the lip well and slanting the drill upward and backward, you are sure to strike the floor of the cavity almost at its lowest point.

Fourth. If a tube must be inserted in this position, it will be held somewhat in place by the lip whether the teeth are present or absent.

The summing up or rationale then of the evidence herewith seems to be. First, that the anatomical relations between the teeth and the antrum are not generally understood, since the sections here shown give evidence of much more cancellous bone than is usually considered to exist.

Second. Small septa are present in a large per cent. of cases, and these septa or ridges have no direct relation to the position of the teeth.

Third. Statistics seem to show that a very small per cent. of abscessed teeth have any connection whatever with the antrum; this per cent. probably not being over seven to ten.

Fourth. The evidence seems to indicate that the protrusion of the teeth into the cavity is very largely the exception instead of the rule,

and that if they do protrude this is not evidence that an alveolar abscess would break there, since these tubercles are usually formed of dense, hard bone.

Fifth. A number of cases have been found where there is a perforation of the bone by the apices of the teeth and no protrusion, but that these apices are simply covered with mucous membrane; thereby the teeth may be affected by inflammation of the antrum, causing their death and loss or a continuance of the trouble in the antrum when such teeth remain untreated, in consequence of this special feature of the anatomy, and that pulpless and inflamed teeth are thought to be the usual cause of antral trouble where the reverse is oftener probably the case.

Sixth. That seemingly the best place to perforate the antrum of Highmore for pus is between the apices of the second bicuspid and first molar.

Discussion.

Dr. Talbot said, having in the last fifteen years made over twenty thousand examinations of skulls, he had found some of the conditions noted by the essayist. Of the skulls of civilized persons, he had noticed many of these separations of the antrum, but had never seen such in ancient skulls of pure races. There is a state of things not brought before you by the paper: it is arrest of development of the bones of the face. This is a condition very common in civilized cities especially. In these cases the antrum is about half the size of the antrum in pure races, and it is such cases where protrusions occur as shown in the specimens exhibited. He said he would like to ask how the treatment would be carried out where a septum nearly closed the cavity? Would there not have to be two openings?

There is much variation in the shape and size of this cavity in different skulls, and it would be well if they were classified as to shape and size and other peculiarities. He had found a number of cases where the opening from the antrum into the nose had been closed, owing to the arrest of the development of the bone.

Dr. Latham said every one knows the difficulty of deciding where to open into the antrum, but she thought the best place was from the socket of the first or second molar, when these teeth are missing or when they can be extracted. A good way to get rid of the pus, when the patient will help you, is by means of constant irrigation,—that is, by washing out with the syringe ten or a dozen times a day.

Dr. Clifford said he was impressed with the desirability, in cases of antral trouble, not to depend upon local treatment. In many cases by treating systemically and getting the system in first-rate condition the catarrh will dry up without other treatment. In cases of purulent secretions of any nature, or affecting any part of the system, constitutional treatment is of the greatest importance.

Dr. Fletcher, in closing the discussion, said that he had not aimed at going into the question of treatment in his paper, but had wished to present the case in a pathological and anatomical light. We should find out what a diseased condition is before we undertake to cure it.

In regard to the septum in the antrum, he said if the perforation was made just where indicated, and the patient assumed a horizontal position, every part of the antrum would drain, except in a case where

the septum extended entirely or nearly across, when of course there would have to be another perforation. If the first molar is absent, the best place for the perforation would be through its socket. In every case he had examined, this would enter the antrum.

He favored both constitutional and local treatment. Some cases are very tedious. He had one now which he had been treating for five months, and it was not cured yet.

The discussion closed, and the section adjourned to meet in San Francisco the first Tuesday in June, 1894.

PAN-AMERICAN MEDICAL CONGRESS—SECTION OF ORAL AND DENTAL SURGERY.

FIRST DAY—*Tuesday, September 5.*

THE section was called to order at 3 P.M. by the chairman, Dr. M. H. Fletcher, of Cincinnati.

In his opening address, after extending a cordial welcome to the members, both foreign and native, who were present, the chairman said in substance, —

This initial meeting of the Pan-American Medical Congress is an era in dentistry which finds it on a thoroughly founded footing as a profession, fully self-sufficient in many respects, though not differing from other sciences in that it depends largely upon several others for its existence. After mechanics, dentistry depends upon nothing else so largely as upon medicine and its specialties.

The greatest advancements known to medicine have been brought about through revelations by the microscope, and these same advancements have done almost as much for dentistry as for medicine; either of these sciences, according to the standard of to-day, would be quite primitive without the recent scientific improvements in the microscope.

Will any dentist dare to say that he can treat his patients intelligently without a scientific knowledge of mechanics, or of physiology and pathology? When dentistry can be separated from the human anatomy, then can it be called an independent science; but until then must it be a specialty of medicine, for these two professions only exist in consequence of the diseases of mankind.

What constitutes medicine or the science of medicine? It is knowledge of the truths relating to the health and disease of mankind, and the administration of appropriate remedies when disease is present.

Then is not surgery a part of medicine, and the amputation of a limb or the opening of the peritoneal cavity for the removal of a pathological growth an appropriate remedy? Is not the removal of a tooth a part of surgery, and the treatment of diseased teeth comparable to the treatment of the eye? When it comes to the supplying of an artificial limb, is it any more prosthetic surgery than the supplying of artificial teeth?

These questions seem too self-evident for discussion, and would not be presented here but for the fact that some of our profession have taken the position that dentistry is not a specialty of medicine.

But has dentistry attained the position of a science? Let us see. Science is "truth ascertained," and dentistry, in order to be a science,

must be able to show to others some truths peculiar to itself, discovered by virtue of the laws governing its demands. What can it show?

First, that the loss of a part of the human anatomy can be artificially restored and made useful by its being retained in position by atmospheric pressure.

Second, that in other cases lost organs are imitated and placed permanently in position by being fastened to a part of the human anatomy.

Third, that the loss of a part of an organ can be permanently restored with indestructible material.

These three discoveries are peculiar to dentistry, and demand for it recognition as a science. But these three things cannot exist without following the laws of mechanics, or be practiced intelligently without a knowledge of physiology, pathology, and anatomy. Here is a demand on four different branches of science.

The discovery by a member of our profession that caries of teeth is due to bacteria marks a great stride in the science of bacteriology, but as yet no germ has been discovered peculiar to the decay of teeth. These germs can all be found in other parts of the body, and may thrive equally well in other places; but the discovery of the part they play in the loss of teeth enables us the more intelligently to battle against their ravages. The same enemies and the same methods of destruction obtain in other diseases and other parts of the body as in the teeth.

The same principles of physiology and pathology obtain in and about the teeth as in other portions of the human frame, and can we say that dentistry has no part with medicine when these facts are before us? If so, a surgeon or dermatologist could as well take the same position. The principles involved in the loss of the teeth are identical with those by which other organs of the body are impaired or lost, and the only novelty about dentistry is the manner in which these organs are repaired or replaced.

The grinding and adjustment of lenses for the various forms of astigmatism require equal, if not superior, skill to that of fitting an artificial denture. Every oculist is supposed to know how to direct the optician in the principles of adjusting a lens to his patient's needs; but how many oculists are educated in the art of lens-making?

The word dentist should imply more knowledge even than the word oculist or gynecologist, for the reason that a dentist should first have an equal medical knowledge to that of any other specialist, and in addition to this he should be a skilled mechanic, capable of manufacturing and adjusting any device demanded by his patient's needs; and there being no two cases identical, he should be versatile enough to adapt foundation principles to any variety of combinations; and lastly, he should be an artist of sufficient taste and skill to reproduce nature in his specialty in her most attractive forms, for in the teeth and lips we read much of character. Does any other specialty of medicine demand so much?

As a profession we are dignified by having special legislation governing our practice. We also have numerous colleges scattered through our land for the education of persons intending to practice this specialty. Why are we thus guarded? Because all our oper-

ations are upon and deal with the life, health, and comfort of our fellow-men. Does general medicine or any of its other specialties demand more?

The diseases of the mouth are seldom epidemic, but is not this cavity the vestibule through which many of our most dreaded diseases enter the body? Hence the need of skillful and intelligent specialists in dental surgery.

The highest skill of the medical world to-day is exerted in efforts to prevent disease, which is equally true in the specialty of dentistry; but with high skill and the greatest of care many mistakes are made. A physician may mistake in diagnosis, and be entirely at fault with his treatment; nevertheless the patient may recover, in consequence of nature's tendency to follow natural laws. On the other hand, by far the larger percentage of the operations of a dentist are as apparent in their result to the patient as to the practitioner, so that we must be conscientious, careful, and accurate, for there are few excuses for mistakes in dentistry, as there may be in obscure diseases of hidden organs in other parts of the body.

As an association of practitioners we represent dental opinion from all sections of the world, so let us be careful to take no position which does not represent good judgment and careful thought, supported by scientific truth.

In all branches of medicine I hope to see the United States, in the near future, in the same position as some European countries, in that the colleges shall educate, while independent and impartial examining boards shall pass on the attainments of the student.

Lastly, in the questions proposed, the papers to be read, and the discussions to follow at this meeting, let us so conduct ourselves that the world may see that our main object is to ascertain the truth, and that we are free from bigotry and conceit, for these latter traits are not accompaniments of true scientific research.

Discussion.

Dr. J. Taft said he was glad that such a paper had been presented at the opening of the section. He approved of Dr. Fletcher's views as to the status of the dentists with relation to the medical profession, and he was glad to note that it was becoming more and more generally held that dentistry was a branch of the great healing art. The feeling is expressed more frequently than ever before that dentistry is a specialty of medicine, but still there are many, including even some of our teachers, who hold that it is a mere mechanical art, or if not this, that it is a profession of itself, apart from that of medicine. It seemed to him that nothing could be plainer than that in all material points dentistry is a part of the practice of medicine. The principles that govern in dentistry are the same as those which underlie medicine in general. Ignoring of this fact ministers to the egotism and self-aggrandizement of those who hold that dentistry is a great profession of itself, which they claim they themselves have created. How does it differ from general medicine? It treats diseases of the same human body, and for the means of alleviating these diseases it depends upon the same courses of treatment in general, governed by the same science, the same knowledge, and the same principles of nature. It seems that the day is quite past when this question should

be disputed. There is nothing to be gained by having it a separate profession; everything to be gained by considering it a part of the great profession of medicine, and making tributary to our success all the investigations, science, and resources of medicine.

Dr. Jacob L. Williams, of Boston, expressed his satisfaction with the views of Dr. Taft. He felt that dentistry, or, as he preferred it should be called, oristry (as expressing the best comprehensive practice), was a specialty of medical science; perhaps this view was partially because he had originally been educated in dentistry as a specialty of medicine. He said that if we look back we will find that its origin was from medical men, and the science on which it is based we owe to medical practitioners.

The facility with which many of the operations may be taken up and performed by the aid of mere mechanical skill and aptitude, and the applause with which mechanical success had at times been received, gave rise to the feeling that it was rather a mechanical pursuit than worthy to be classed as a learned profession.

Dr. S. B. Brown, of Fort Wayne, Ind., said that it seemed proper that we, in a section of the Pan-American Congress, have assumed that dentistry is a specialty in medicine, but nevertheless we stand as dentists, and take pride in the advance the profession of dentistry has made.

Dr. George Evans, of New York City, then read a paper, an abstract of which we present, as follows:

PULPLESS TEETH AND THEIR TREATMENT.

It is doubtful if dental literature presents another subject on which so much has been written with so great diversity of views as that of pulpless teeth. This is equally true whether as regards the description of the conduct of operations for the prevention of possible lesions, or the prescription of remedial treatment for the cure of existing troubles.

As almost universally accepted principles govern these matters, it is in the details of methods of procedure and therapeutics that these diverse opinions are found to exist. I shall endeavor to present for your consideration, discussion, and criticism, an intelligible conception of the subject, based as much as possible on science instead of empiricism, and practical experience rather than theory. I shall hope thus to assist in arriving at conclusions which will be ultimately universally recognized as correct in surgical procedures and most suitable in therapeutic treatment.

A pulpless tooth is understood to be a tooth with a non-vital pulp, or one from which the pulp has been removed, with consequent loss of vitality of the dentine. Respecting the remaining structures of such teeth, we have one of two conditions presented: the first where the vitality of the entire cementum is retained, the other with non-vitality of a part of the cementum on the side of the root, or of the portion constituting the apex, through the action of devitalizing agents or the presence of some lesion. Independent of other pathological conditions present, according to the degree of existing vitality as contributed by the connective tissue, the pericementum, favorable effects of treatment may be expected and permanent results assured.

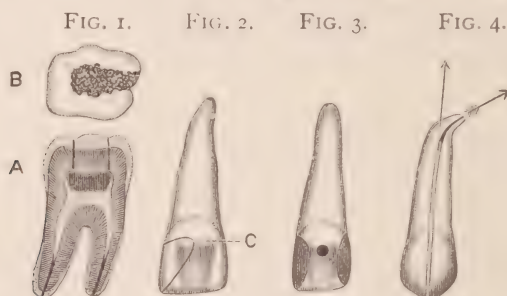
The treatment of pulpless teeth or roots, for the prevention of future trouble or in connection with the cure of existing lesions, consists in as thorough a performance as possible of the following operations:

First, removal of the contents of the root-canals.

Second, disinfection of the root-canals and dentine, and the establishment of permanent aseptic conditions by mummification of the contents of the tubuli.

Third, closure of the apical foramen.

Preparation of Root-Canals.—A knowledge of the usual positions, forms, and variations of the roots and canals in the different teeth is essential for a generally successful performance of this operation, which is greatly facilitated by obtaining direct access to the root-canal by a proper removal of the tooth-structure. This in a lower molar is illustrated in section in Fig. 1, A. The slot in the occluding surface, it will be seen, is sufficiently extended to give direct access to the canals of both roots; an approximal decay requires similar extension (B). In the incisors enough of the palato-approximal wall



should be removed to allow instruments to be used with the least possible curve, as shown at C, Fig. 2. Should this, in the opinion of the operator, involve too great a loss of tooth-structure, a small hole can be drilled in the palatal side, as seen in Fig. 3, and direct access to the canal thus obtained. The drilling of holes such as this is best confined to centrals, as if made in laterals and both approximal sides decay, the palatal wall is seriously weakened by the loss of so much of its structure, as shown in Fig. 3. In molars, when cervical decay of moderate extent involves the vitality of the pulp, and the contour of the coronal section is only slightly encroached upon, an independent entrance to the pulp-cavity had best be made in the center of the occluding surface for the treatment of the root-canal, the cervical cavity being filled separately.

The principles here outlined can also be applied to cuspids and bicusps. In crown-work on the anterior teeth, the removal of the coronal section directly exposes the pulp-cavity. In preparing bicusps and molars for all-gold crowns, the leveling of the occluding surface and removal of a portion of the side most involved by decay should be preliminary.

A proper opening having been made, any remaining portion of the pulp is removed with broaches. A few fibers of cotton should be twisted around the serrated portion of the broach, to allow of easy

removal in case of breakage. The canals are then, guided by frequent explorations with a fine probe, carefully enlarged with Gates-Glidden drills. At least three sizes, large, medium, and small, of drills each for the right angle and the direct hand-piece, are required. Very little, if any, pressure should be put upon them when in motion, as they will move forward sufficiently of themselves. Under pressure the formation of a false passage in a curved root is possible, or the small drill might be broken off or forced through the apical foramen with disastrous consequences where alveolar abscess did not exist. Neither should drills be forced into a canal closed by calcification, nor into the canal beyond the line of the apical cementum, nor through a constriction which a fine flexible probe cannot enter, nor around a curve sharp enough to be unsafe to pass. A slight pain, of which the patient should be instructed to notify the operator, is experienced when they enter the zone of cementum which composes the end of the root, if its vitality has not been impaired by improper use of arsenic in devitalization of the pulp, or by alveolar abscess. The probe-like points of these drills do not cut, but simply guide the drills and confine them to the line of the canal. They should be gently given a constant slight forward and backward motion in the canal, and treated more as reamers than drills. Unless thus used, the coarse serrations of the head of the drill may fasten in the canal, when the head is liable to be broken off. The occasional quick withdrawal of the drill from the canal during the process of drilling will aid removal of the *débris*.

The depth to which a canal may be enlarged or reamed is regulated by its actual length and previously ascertained condition, and the diameter of the enlargement by the shape and dimensions of the root. The use of these drills is condemned by some operators for reasons properly attributable to their careless or improper employment, but they are indorsed in experienced hands for their adaptability to the work under consideration. They should be frequently sharpened with a suitably shaped Arkansas stone. The shank just back of the head should be large enough to assure strength. The temper should be such that the steel may be bent but not broken, even though the edges of the serrations become sooner dulled. The Palmer root-canal excavators also will be found serviceable to open up a canal and enlarge it in accordance with its original shape.

The reaming of a canal not only simplifies the operation of filling, but also opens up the ends of the tubuli, and facilitates the permeation of the dentine by antiseptic agents, the advantage of which must be admitted when a septic condition is present. Under favorable circumstances the line of the zone of cementum at the end of the root is a safe point to ream to and stop at.

I am aware that some few operators state that they do not ream out root-canals, but claim to treat and fill them as well as those who do. Careful investigation of the subject seems to demonstrate that the majority even of these, in obtaining an entrance to a canal, enlarge the orifice and to some extent really ream out the canal. The reaming, then, is with them only a matter of extent. I also find, as a rule, that in proportion as root-canals are properly—I do not mean excessively—reamed and opened up, so are subsequent operations on them satisfactorily performed.

In the treatment of alveolar abscess, the canal should be enlarged as already described, and the foramen, if possible, opened up with a smooth broach instead of a drill. Drilling through the end of a root or extensively into the cementum at the apex is to be condemned, except when it is desirable to afford immediate relief to the patient in cases of acute abscess. In chronic alveolar abscess the immediate or more prolonged action of agents sealed in the canal for a day or more, for the purpose of disinfection, will usually facilitate the passage of a broach or permit peroxid of hydrogen to be forced through. When this is not the case, a fractional part of a drop of aromatic sulfuric acid, held in position in the end of the canal on a few shreds of cotton for twenty-four hours, will usually effect an opening unless exostosis exists. My objection to attempting to drill through a foramen is that although the main line of the canal may be straight, or nearly so, the extremity of the root to some extent curves in a large proportion of cases, a condition impossible to always determine; and as a sharp-pointed drill has to be used, it will move rather in a straight line than a curve, so that a passage to one side instead of through the foramen is likely to be made (Fig. 4). This leaves the apex in a form not conducive to successful treatment unless a bur is subsequently introduced externally into the region of the abscess, and that part of the apical section of the root removed.

Therapeutic Treatment of the Root-Canals.—Pulpless teeth are presented for treatment in either of the four following conditions:

1. Where a healthy or non-putrescent pulp has been extirpated from the canals.
2. Where on opening into the pulp-chamber it is found empty and dry, with the pulp mummified, or the root-canal calcified, and the root externally in a healthy condition.
3. Where a pulp is found in diseased or putrescent condition.
4. Where alveolar abscess is present, and a septic condition of the canals and dentine exists

In the first and second classes the treatment should be directed to assuring a continuance of the existing aseptic condition, and as immediately as possible filling of the canal; in the third and fourth classes, to bringing about an aseptic condition by disinfection and sterilization, and making certain of its future maintenance, including incidentally the cure of any existing disease of the external membrane or of the alveolus.

In cases of the first and second classes, water and saliva should be excluded from the pulp-chamber and canals during their entire preparation and filling. The instruments should be sterilized, and the broaches, if serrated, had better be new. In the third and fourth classes, exclusion of saliva or water is not necessary in the preliminary work on the canal; water may be freely used until the process of disinfection and sterilization is commenced. Then and thereafter its entrance must be prevented. To this end the rubber-dam should be applied if practicable. When it is not, as frequently occurs with roots and teeth badly affected with cervical decay, other means of keeping out moisture should be resorted to. In such cases, during each interruption in the operation the entrance to the canal should be filled with absorbent cotton saturated with a suitable essential oil or antiseptic fluid, and saliva thus excluded.

After the canal has been properly opened up and its contents removed, it may be washed out with peroxid of hydrogen, and wiped out with absorbent cotton. The next point in the conduct of the operation is to secure as thorough a state of dryness into the pulp-chamber by an ordinary or an A. S. Richmond hot-air syringe, at a temperature higher, as it leaves the nozzle, than is comfortable for the finger. A root-canal dryer, with the end tapered as fine as a broach at the point, is then introduced into the canal. I prefer the form in which the point is made of silver and the bulb portion of copper. As silver possesses remarkable properties as a thermal conductor, the heat is transmitted to the point of the probe very rapidly. The probe being inserted as far as possible up the canal, the patient is directed to raise the hand as a signal should the heat cause pain, when the probe must be moved up and down or withdrawn for a moment. This procedure, following the previous application of the hot air with the syringe, evaporates the moisture and aids the escape of any gases present in the root-canals and the open ends of the tubuli. The point of the root-canal dryer acts as a sterilizer, and may be applied so hot as to carbonize any organic matter which it reaches in the end of the canal, a portion of which can each time be removed on its point. As the silver point can be tapered as small as the finest broach, canal-contents impossible to remove may be reached or rendered inert.

In cases of the third or fourth classes, sepsis being present, the heat is very serviceable, as it aids the escape of gases from the canal and dentine and acts as a germicide. When in this dry and heated condition, the dentine is in the best possible state for the application of antiseptic agents.

The suitability of various antiseptics to the needs in treating tooth-structure, their effectiveness and permanency when so used, singly or in combination, are subjects on which great diversity of opinion exists, and which have of late been made the object of clinical study and scientific investigation and discussion. Many antiseptics in common use being coagulants of albumen, obstruct the dentinal tubuli, and consequently limit or retard diffusibility throughout the dentine. This is the objection to the use of carbolic acid, creasote, and like agents, additionally to which may be named their inefficiency to accomplish in certain conditions the end sought, and as well their eventual absorption from the dentine. Recent investigations seem to give preference to such antiseptics as are non-coagulative in their action. Of this character are the essential oils, many of which, according to Miller, Harlan, and others, possess antiseptic power much greater than has been commonly attributed to them. Acidulated solutions of bichlorid of mercury, peroxid of hydrogen, the new agent sodium peroxid, especially in preliminary treatment, and various preparations of iodine, which exert chemical action and retain antiseptic properties for a great length of time.

The selection of antiseptic agents is important, and is indicated by the conditions presented in a pulpless tooth. Cases in which a healthy pulp has just been extracted, or the canal is aseptic, are different from those with sepsis of dentine or diseased or putrescent pulps. In the first-mentioned condition, with or without antiseptic treatment, favorable results usually follow root-filling, the advantage of a reliable antiseptic agent in the canal being only to better insure the continu-

ance of a state of asepsis. In the second condition the state of the dentine, and consequently the treatment to be effected, are entirely different. We need the action of agents that will not only destroy ptomaines, but exert a chemical action on sulfuretted hydrogen and ethereal, ammoniacal gases, the products of putrefaction, and entirely eliminate them. On this depends the successful treatment of such cases, as the pressure and expansion of these gases are a certain cause for constant peridental inflammation, and so long as they are present in the slightest degree in a canal it is in an unsuitable condition to be closed. Carbolic acid, creasote, or the essential oils, in such a condition exert no chemical action on these gases, merely disguising their odor, though by repeated dressings of cotton saturated with these agents the gases are absorbed by the cotton, and to an extent slowly eliminated. What is required is the action of agents whose elements possess an affinity for these gases, and will immediately decompose them, forming new combinations and entirely destroying their character.

Regarding the use of agents in treatment of septic dentine of pulpless teeth, Dr. W. F. Litch, in a paper published in the DENTAL COSMOS, February, 1882, says, "In this respect a careful discrimination must be made between the powers respectively of such antiseptics as carbolic acid, creasote, oil of cloves, oil of thyme, etc., and such other antiseptics as chlorin, bromin, and iodine, which, in addition to their antizymotic power, are true chemical antagonists of those sulfuretted hydrogen compounds of which putrefactive gases are constituted, such gases being immediately decomposed by them; their hydrogen element going either to chlorin, bromin, or iodine, to form respectively hydrochloric, hydrobromic, or hydroiodic acids, the sulfur being in each case precipitated." . . . "An antiseptic agent as carbolic acid cannot be said to be a true disinfectant, in the sense that all the products of putrefaction are decomposed by its presence. No matter how thoroughly the odor of putrefactive gases in a room or in a tooth may be masked or disguised by the characteristic odor of carbolic acid, creasote, oil of cloves, or indeed any antiseptic oil, the gases are none the less present, although their odor is neutralized; the disinfection is only apparent, not real; the further formation of putrefactive gases may be prevented, but the decomposition of those already formed must be accomplished by those chemical agents already cited."

I bring these facts respecting these agents emphatically to your notice, as I am conscious that a large proportion of practitioners at the present time still entirely adhere to and depend on carbolic acid or creasote exclusively for the treatment of the conditions presented in pulpless teeth.

In accordance with these principles, the use of iodine is indicated and preference is given to its use in practice to that of the other agents mentioned. Its effects are best obtained from some one of the preparations now in use,—aristol, for instance, its odor being entirely unobjectionable, in a strong solution in one of the essential oils. In my practice I favor the oils of cloves, cassia, and eucalyptus. I consider the oil of cloves more sedative in action than the others. I make it a point to flood the canal with the solution, thereby to some extent saturating the heated dried dentine as well as the cementum at the

apex. A more effective saturation can be accomplished by again drying and heating the dentine and applying the solution, or by filling the canal with cotton saturated with the solution, hermetically inclosing it and letting it so remain for a day or two.

I do not claim that coagulants, such as creasote or carbolic acid, are entirely non-diffusible in devitalized dentine or cementum, as decomposition or putrefaction effects elementary changes in the contents of the tubuli, but that their action is slow and limited compared with that of the essential oils. They have also the objectionable feature of being irritants, and unsuitable where acute or chronic inflammation of the peridental membranes is present. I wish to mention this forcibly, for there are prominent men in the profession who advocate carbolic acid as the most suitable, and in the treatment of alveolar abscess as the best, remedial agent, declaring with great positiveness that the use of all other agents is useless and a waste of time. The history of the indiscriminate use of carbolic acid and creasote in practice, by others and myself, has convinced me that they are not in all cases and at all times suitable therapeutic agents to use. When a healthy pulp has just been extirpated, and "immediate root-filling" is practiced, the use of carbolic acid, creasote, or solution of chlorid of zinc is best indicated, the condition then presented being entirely different from that where the pulp is diseased or putrescent, or the canal is in a septic state. When a healthy pulp has been removed, its minute fibrous connections with the walls of the canal and the vessels at the apical foramen are severed, and the action of an escharotic antiseptic agent, such as carbolic acid, is in fact then indicated, as it acts as a coagulant and instantly seals up the ends of the tubuli. If "immediate root-filling" is not to be practiced, then the prescription of such agents as the essential oils, with aristol or iodoform, seems more suitable, as by their action a slow but certain mummification of the non-vital organic matter follows. Moreover, the oils possess advantages over the coagulants mentioned in not being miscible in water, this being eliminated, so that by their use the antiseptic action is perpetuated.

From these statements it might be asked, What special advantage is there in the much-discussed method of "immediate root-filling," beyond that of the time gained by the operator? I would answer that in the proper conduct of treatment there is none. A canal with an antiseptic dressing, with the orifice of the canal and cavity hermetically sealed securely with gutta-percha or oxyphosphate of zinc, is free from the danger of inroads of micro-organisms or of the super-vention of sepsis for a reasonable interval of time. The disadvantage of immediate root-filling is that, should some fragment of the pulp remain in the extremity of the canal, it fails to receive the benefit accruing from the reapplication of antiseptics, which would better assure inertness by mummification.

In brief, my conclusions are that in cases of pulpless teeth, where an aseptic condition of root-canals and dentine exists and immediate root-filling is to be practiced, the use of coagulants, such as carbolic acid or creasote, alone or in combination with other suitable agents, is permissible, but when sepsis exists their use is contraindicated in favor of non-coagulants; that treatment with such agents should be followed and the filling of the root be temporarily deferred; that if alveolar abscess exist, treatment through the apical

foramen by injection should be restricted to the use of non-coagulants, until disinfection of the dentine is effected.

There is such a thing as over-treatment,—an unnecessarily frequent renewal of antiseptic dressing in root-canals, thereby aggravating or producing irritation of the pericementum at the apex of the root. Such cases may be relieved by washing out the canal with alcohol and applying the alcohol on the dressing, instead of the agents previously employed.

Closure of the Apical Foramen and Filling of the Canal.—The object of root-canal filling is to prevent the entrance of the fluids through the foramen, and avert, in case of the formation of gases, irritation of the peridental membranes by their pressure or presence.

Respecting this branch of treatment, I might say that there is no difference of opinion as to what ought to be done, but preferences exist as to the method of procedure and the materials to be used. Gutta-percha or oxychlorid of zinc are generally accepted as the most suitable. Either gutta-percha in the form of chloro-gutta-percha, or the oxychlorid of zinc mixed thin, can be pumped or placed in the extreme end of the canal with the aid of a broach or fine pointed probe. This is one of the advantages that commend the use of these materials. When the chloro-gutta-percha has been placed in the apex, the remainder of the canal can be filled with the prepared cones of solid gutta-percha until no more can be inserted. A current of hot air should then be thrown on the protruding ends of the cones at a temperature sufficient to soften them and warm the dentine, when they should be gently pressed, but not suddenly pushed, up in the canal. A slight twinge of the patient will usually be the signal of their complete impactment in the canal. The solid gutta-percha absorbs what little chloroform was present in the chloro-gutta-percha, and the heat also aids its evaporation, so that the shrinkage so often urged as an objection against the use of chloro-gutta-percha is reduced to a minimum.

An advantage possessed by oxychlorid of zinc over other materials is its antiseptic qualities ; its disadvantage, the difficulty attending its removal from the extremity of the canal should supervening conditions require it. I frequently use it in combination with gutta-percha, filling the extremity and part of the canal with gutta-percha, and then the orifice and pulp-chamber with oxychlorid. Wood and metal shaped to fit the canal are also much used to fill root-canals, but unless a small quantity of chloro-gutta-percha or oxychlorid of zinc is placed in the extremity or on the point used, the entire closure of the canal is doubtful. The use of cotton as a filling in root-canals is to be condemned, unless it is sterilized or iodoformized and saturated with chloro-gutta-percha previous to insertion. Asbestos by some is given preference to cotton. Tin or gold foil is difficult to insert without vacuoles. Paraffin in combination with a small quantity of aristol, as a material to fill root-canals, has been suggested by Dr. Kirk, especially after the use of sodium peroxid,—sodium peroxid being a most active solvent of albuminous matter, in a measure frees the ends of the tubuli or a canal of their organic contents, a condition favorable for the use of paraffin. Paraffin is aseptic and melts at a low temperature, and can with a heated root-canal dryer be flowed into the ends of the tubuli or a minute canal that was not considered safe

to open up. Ordinary gutta-percha should be used to close a foramen when an abscess has just been treated by injecting through it. The length of the canal should be measured with a probe, and gauged with a small perforated disk of rubber-dam slipped upon the instrument. The gutta-percha should then be carried to position on the point, and an allowance made for the displacement of the instrument. As oil of eucalyptus is a solvent of gutta-percha, the application of this oil, alone or in combination with iodoform or aristol, is recommended in the final treatment when chloro-gutta-percha is not used, as better adhesion of the gutta-percha to the walls of the canal is thus obtained. In a case of chronic alveolar abscess, where amputation of the apical section of the root is to be practiced, oxychlorid of zinc makes a most suitable filling.

It is not my intention to discuss the subject of alveolar abscess, more than to say that it matters not what form it may present, treatment primarily should consist in a thorough disinfection of the canal and dentine of the affected root, and finally the adoption of such measures as will maintain a state of asepsis.

I feel that I cannot well close the paper without some comment on the method proclaimed by Dr. Herbst of treating pulps in teeth ordinarily classed as pulpless, and which has of late been given considerable prominence. The idea of this method is to devitalize with cobalt only the section of the pulp in the pulp-chamber, remove it and seal up the portion in the canal, adopting measures during the operation to maintain asepsis, as the pulp will then probably remain inert in case of non-vitality supervening. The object is to simplify and lessen the work on such teeth, and retain some circulation in the dentine from the remaining vital pulp in the roots.

The objections to this method, briefly stated, are :

1. The action of cobalt or arsenic in the devitalization of a pulp is not controllable.

2. Even though the vitality of the pulp left in the root-canals is retained, an atrophied and then a non-vital condition is liable to follow also, as a large percentage of exposed pulps are diseased, and in such cases sepsis will supervene.

3. The method in result is similar to the operation commonly performed in which antiseptic measures are adopted, but lacks thoroughness respecting the treatment of root-canals.

4. Its performance in detail, as described, would require in many instances as much time as the recognized method in practice.

5. Present recognized methods show an exceedingly low percentage of failures, and the practice of Dr. Herbst's method would commence an era of doubt and uncertainty respecting operations on pulpless teeth.

6. The introduction of such a method in the teachings of the schools and elsewhere would have a tendency to encourage a lack of thoroughness in operations on pulpless teeth.

I make this criticism with due deference to the investigations and statements of Dr. Herbst, and respect to the gentlemen in this country who have advocated his method.

Having presented to you my conception of what I consider should be the treatment of pulpless teeth in accordance with correct scientific and rational principles, and as dictated by modern methods of

practice, I might ask the question, Are these described operations always possible of perfect performance? We work at times under great difficulties, in places unseen, and we cannot assert what is unknown. I consider it far preferable to suspend efforts to effect thoroughness in a root-canal than to risk penetrating foramen or wall; better to fail to thoroughly impact the filling than to force it through the foramen into the apical space. The former would be designated a failure; the latter would be a mal-performance. Sound judgment counsels caution, which with knowledge and skill will as a rule insure present and future satisfactory results in these operations.

To the educated, skilled dentist of the present day, few pathological conditions of the teeth are uncontrollable, and in mechanical operations extraordinary results are possible of attainment. Treatment of pulpless teeth in accordance with the principles and methods advocated I believe will be classed among his greatest successes.

Discussion.

Dr. J. Rollo Knapp, being called upon to open the discussion, said that he could commend the paper highly, though in some points his practice differed from that of the author.

Dr. S. B. Brown said the subject of pulp-canal treatment and filling was one of great importance in practice, and we cannot talk and think about it too much. Drilling out and enlarging the canal he thought not good practice; the better treatment was to take the canal as we find it. He had not much confidence in the filling of root-canals with gutta-percha alone, but preferred gutta-percha with chloroform, as it could more surely be gotten to the apex of the canal. He had ceased to use gutta-percha points, as the solvent used in making the points was liable to soften the material, so as to make the filling imperfect. He preferred the use of copper or tin points, as with them he felt that he could make more reliable fillings.

Dr. H. B. Noble said that in the main the paper agreed with his own notions in regard to the preparation of pulp-canals, and certainly where the author deprecated the use of creasote and carbolic acid. The time was when these two drugs were considered a necessary part of the outfit of every dental office, when in truth one could not enter a dental office without being made aware of their presence. He did not think the office should be saturated with these unpleasant odors; thought that the essential oils, with peroxid of hydrogen and other well-known germicides, were much to be preferred in use, and were much pleasanter. Of course, we still have iodoform; but with care, annoyance from its odor is not serious. He used aristol and eucalyptol with success in the preparation of root-canals. He regards oxychlorid of zinc as the best filling for canals; upon a shred of cotton it can be carried quite to the end of and thoroughly fill the minute crooked canals of a majority of roots.

He has but little faith in any filling in a canal so placed that it could be removed. He feels that the removal of any filling would cause irritation enough to make trouble and set up inflammation. He would depend upon treatment from the outside rather than open up through the canal.

Dr. Jacob L. Williams did not agree with the paper in regard to the best material for filling the root-canals. He thought that no mat-

ter how thoroughly or carefully a root-canal is treated and filled, there was always a possibility of trouble some time in the future, which would necessitate removal for relief. It might be all right for a long time,—even six, eight, or ten years; but then, perhaps, on account of a low state of health in the patient, an inflammation would arise, and it would be desirable to remove the filling for relief and treatment. It was so nearly impossible to get out gutta-percha fillings that he did not feel it wise to insert them.

His practice was to take rods of lead, zinc, tin, or copper, and having shaped them to fit the cavity, imbed them in a mixture of tincture of benzoin with oxid of zinc. This paste will make a tight, permanent filling. He allows the end of the rod to extend into the pulp-chamber, and turns it over after it is set in the canal, and fills over it with gutta-percha. In case of necessity, it is easy to remove the gutta-percha, and then get hold of the end of the rod and draw it out of the canal.

In regard to the oxychlorid of zinc and the condition in which it should be used, the antiseptic qualities of oxychlorid of zinc were formerly depended upon for the preservation of teeth whose pulps were endangered; but in many cases the teeth became discolored, and upon removing the fillings the oxychlorid was found not to be solid, but simply a mass saturated with septic matter. For this reason he had lost confidence in it as a permanent antiseptic, and uses oil of cassia with eucalyptol, or liquid paraffin, which is a nice vehicle for antiseptics.

Dr. J. Taft spoke of the desirability of preserving the vitality of the pulps of the teeth, and the necessity of impressing both dentists and their patients with the importance of preserving their vitality. Our patients are very careless in this regard. It is difficult to make many of them understand that a living tooth is better than one with a devitalized pulp. If they would appreciate this as they should, we would have fewer devitalized pulps to deal with.

He had patients who had been under his care for years and years who had not a devitalized pulp in their mouths, because they saw the necessity of watching their teeth and having them properly cared for in time. He would emphasize to all dentists the necessity of preserving the vitality of the pulps, and teaching patients the importance of these organs.

When a person has anything the matter with his eye, he needs no promptings as to the necessity of having it promptly and skillfully cared for, as every one feels the importance of sight; but a tooth is neglected till the suffering becomes unendurable, and then, if it can only be relieved by the death of the pulp, it is sacrificed, when, if treated in time, it might easily have been saved. It would be much better for the interest of both patient and dentist if the treatment was had in time.

But do what we will, these pulpless teeth will come to us. The question is, What shall we do with them? Beyond and beneath the detail of management lie the conditions of each case, which must be studied. A tooth is presented, to be put in the best possible condition. What shall be done with it? Deal with it as with a piece of metal? Not at all. The teeth are subject to different conditions, which must be understood. Some teeth are deteriorating, but will

go on for years and years, and at last will be lost ; others more rapidly will go from bad to worse, and soon develop active disease. We should give attention to these varying conditions, because they affect the treatment, which depends upon the susceptibilities of the living tissues. Some teeth may be very troublesome, and yet because of strength and power of the system they will recover and remain quiet. All these conditions will modify the treatment.

When we have a dead pulp to deal with, we must first free the canals and the tissues contiguous on the outside of everything that will cause disease. Remove mechanically all that is possible, neutralize and destroy with chemical or antiseptic means what may remain ; then close up the space with something that will not be an irritant to the tissues beyond ; keep out all that will produce poisonous gases and cause the trouble to recur. This should be so well done that there should not be any thought of removing the filling for re-treatment. If trouble should ensue, it will be because the operation was not thoroughly done at first, and an irritant was left which will have given rise to abscess. The better way, then, will be to penetrate to the root from the outside, and so cure the abscess.

The general principle in treating a pulpless root is to fill it up completely with metal, wood, or anything else that will accomplish the purpose. He spoke of the new preparation, —pyrozone, —and recommended its use.

Dr. Williams said that the chief characteristics of a root-filling were that it must be antiseptic, and that it must completely fill the root-canal. He spoke of operations of a surgical nature, where, in after-years, owing to a low vital state, trouble occurred at the seat of the operation, and said that such trouble, under like conditions, was liable to occur in a tooth that had been devitalized and the canals filled.

Dr. Fletcher said he realized that the subject had been pretty thoroughly gone over, especially as far as the treatment was concerned, but he wanted to speak of another difficulty we contend with in these cases. In surgery we have a definite lesion and treatment plainly indicated. If there is a sarcoma, or a tumor in the abdomen, we know it must be removed. And so it is in many diseases : there is a recognized lesion and a definite pathology, with a definite theory of treatment. A definite exciting cause is found, and the treatment is to remove this. Is this true in dentistry regarding the subject before us ? Do we first diagnose the case correctly ? Has any one so defined these conditions that we can say this is periostitis, and has been caused by certain pathological processes, or there is pus at the end of the tooth, which was excited into formation by bacteria entering through the pulp-chamber, or why is obliteration of the chamber and canal a removal of the exciting cause ? He did not think these have been thus well defined.

When we know what is the matter we know what to do, but we do not have perfect definitions so as to understand how to discuss it. He hoped some one would take up the subject, and systematically name the conditions so they would better know what they were talking about, and have a defined condition for definite terms. Then we will not argue on a basis of faulty nomenclature, but discuss the pathology, physiology, or treatment.

Dr. Taft said it would be difficult to do that, because the conditions

were so various. It would be necessary to go to the very depths of the pathological conditions and the physiological conditions, and then it would be impossible to define them so that any other man would recognize them. It requires thorough knowledge of the conditions for each man.

Dr. Evans said that his paper, he thought, concerned some of the questions brought up in the discussion. He had stated that a metallic filling would not, except in connection with some soft material like oxychlorid of zinc or chloro-percha, successfully fill the foramen.

In regard to removing the filling, it is all right to fill so that it cannot be removed if you could be sure it would not be necessary to remove it. If one could be quite sure of this, the plan of Dr. Morrison, which was to gauge a piece of wire the shape and length of the canal, and mark the length with a notch cut in the wire, which would enable the operator to break the wire off at the notch, would be a good plan; but in case it was necessary to remove such a filling, it would be found almost impossible to do it.

He thought the new preparation for clearing out pulp-canals—sodium peroxid—an agent that will surpass anything we have heretofore had. It is a solvent, and opens up the canals and tubules in a wonderful manner. He thought, with Dr. Fletcher, that the subject of the pathological conditions of the teeth had not been studied up as it should, and it would be well if the books described them better.

The section then adjourned.

SECOND DAY—*Wednesday, September 6.*

The section was called to order at 3 P.M., Dr. M. H. Fletcher in the chair.

Dr. Jacob L. Williams, of Boston. I sent to the secretary the synopsis of a paper that I hoped to write out in full, but I will say a few words that may perhaps make more plain the idea I wished to present.

In regard to education as preliminary to the study of medicine and surgery, it is generally conceded that the more liberally the student is equipped in all knowledge having any bearing on his proposed professional study, the more satisfactory will be his progress in that study. But with the best preliminary training we often find that the medical pupil needs reminding of the facts and principles the knowledge of which is supposed to be a part of his preliminary acquirements; so also when he comes to the learning of facts and principles that underlie the laws of health and disease, the average student most especially needs constant training in the relation of those principles to clinical or actual cases.

This is what may be called qualifying education for practice of general or special medicine and surgery. Perhaps this qualifying need is at present most observable in regard to the practice of specialties, of which that of oristry is by no means an exception.

With the ambition, laudable in itself, to excel in manipulative skill, how often do we see the unfortunate results of forgetfulness or ignorance of the principles that should direct or restrain that skill.

To illustrate, it is well known that a heavy blow on the head is apt to produce paralysis of a longer or shorter duration. It is also known—I think first proved by the elder Agassiz—that from continu-

ous lighter blows, the jarring irritation of the peripheral membranes of the brain, a similar result may follow. Ignorant of this fact or principle, a dental operator who prided himself on his skill in building up gold fillings with a heavy mallet, once subjected his patient, a man of fine nervous organization, to sessions of several hours a day for five consecutive days, in building down the six upper front teeth, with the result of paralysis of the patient, from which he only partially recovered, but died in about two years.

Take another actual case. It is well known as a surgical principle that tissues of low organization, like ligaments and cartilage and the gums when wounded, draw more largely in healing on the constitutional vitality of the patient than do the more highly organized tissues of the body. Ignorance of the principle resulted fatally in the case of a lady in a moderate degree of health and strength that required constant care, whose dental attendant extracted sixteen teeth at one sitting. On going home she took to her bed, and died from vital exhaustion in a fortnight. Now, no doubt these operations were skillfully done, but the skill was misapplied, and you know the axiom: "The greater the skill misapplied, the greater the blunder." Many less serious cases might be mentioned.

Now, what I would urge, as from my observation for some years in our own specialty, is the greatest need of more and constant attention, in the schools and with practitioners, to what a zealous doctor, now deceased, used to call "the underlying principles," as the basis of correct practice.

With a knowledge of those principles and how to apply them, one need have no question in what domain he is properly working.

Synopsis.

Preparatory knowledge for the study and qualifying education in the application of principles for the practice of specialties in medicine and surgery.

A highly encouraging indication of progress in general professional education, as well as in our special department, is the increasing appreciation of the importance of such preliminary knowledge and training on the part of the student as will enable him to comprehend accurately and readily the instruction given him in his professional pupilage. That this is essential to the best progress in study no one disputes, and requires no argument.

But there is another need which seems too much neglected, or too often only casually implied, in the course of the professional study intended to fit the student to practice. This need is in the matter of direct education in the general principles of medicine and surgery,—that is, in the laws that govern the vital economy in health and disease, the knowledge of which, with the trained ability to apply it, is the only basis of the soundest practice. I say trained ability, for it is not common for the average student to recognize readily the correct relations and applications of those general principles to the cases he may see in practice. It is only the few with special natural intuition that can do so without constant reminding of those relations by their teachers, by which constant training they may in time acquire a habit of such application.

That skill in operation and manipulation is one essential no one

questions ; but if that is all to the neglect of knowing how and when to properly apply that skill, the student is only half fitted for practice, and that only by rote, as it were, as his skill is quite liable to be misdirected. And the axiom in engineering holds good here too : " The greater the skill misapplied, the greater the blunder." This ability to discern principles in the application of skill distinguishes the professional practitioner from the simple mechanic, and those possessing it, with an ethical basis of character, may have no doubt that they belong to the great profession of ministers of nature in treating human ills.

Discussion.

Dr. Wm. Carr asked Dr. Williams where he thought the fault lay for the lack of the preliminary knowledge needed as the basis of dental professional education.

Dr. Williams answered that it lay in the fact that the dental schools did not teach the principles of medicine and general surgery to the students, and did not impress the necessity of the application of these principles upon them. The highest ambition of the dentist is usually to do skillful operations ; any jeweler could do these operations. Unless the dentist has a thorough knowledge of the fundamental principles of medicine and surgery, he will never be sure to practice his profession worthily. He related an instance of a pupil who was about to graduate from one of the schools in Boston, who showed by his questions that he was woefully ignorant of the plainest principles which govern the treatment of diseased teeth. Under the present system of teaching, students are taught too much to do everything by rote.

Dr. Carr said that the fault lay in the want of a rule insisting upon a preliminary fitness before a student was admitted to a dental school. In New York state, before a student can be admitted to the study of law or medicine, he must have a degree from some reputable institution of learning, either the Bachelor of Arts or Master of Arts, or at least a certificate of fitness from the regent of the university. He thought the day was not far distant when the dentist would be really as much a specialist of medicine as the oculist,—when it would be required of him to first get the M.D. degree, and then his dental degree as a specialist. There is a movement on foot now to accomplish this result in New York.

Dr. Noble asked if they looked up the history of students before matriculation, to learn whether they were possessed of these qualifications.

Dr. Carr said they did not now, but they intended, or at least hoped, to have it so in the future. At present the preliminary examination is of the most trifling character. This thing will never be righted till we take it out of the hands of the colleges. It is too much of a temptation to the officers of a college when a young man says that he cannot afford to study so as to pass a reasonable examination, and who promises to do his best during the course. He did not mean that the fee was the temptation, but that the sympathies of the faculty were worked on. They make a mistake, for it would be better for the student to be held back for two years, if necessary, till he has had time, by study, to train his mind for the reception of the

knowledge he must master in order to practice dentistry intelligently. The fault, too, often lay with the preceptors of the students, or the dentist who is asked to advise the young man about the study of dentistry. In every case he insisted upon his students possessing a good general education preliminary to their going to a dental college.

Dr. Noble agreed that the preliminary examinations in the dental colleges were generally very trifling, and that every dentist should refuse to receive any student till he has fitted himself by study to enter the college.

Dr. Carr related an instance of a young man who, having failed entirely in the effort to go through the course in the dental college, set up an office, called it a dental association, and began practice. Having been arrested for practicing illegally, he promised not to practice in the state if he was released. He was released, and came to Dr. Carr and asked him what he was to do; said he could not go into any other kind of business, but could make a living if allowed to practice dentistry. Dr. Carr told him to go to the college. He said he could not, as he was on bad terms with the professors. He opened another office, was arrested, and fined one hundred dollars. He then applied to the college, but failed completely in his preliminary examination; this was in March. In October he passed the preliminary examination, got into the college, and in the course of five months passed the junior, senior, and final examinations, got his diploma, and is now practicing, and no one can hinder him. This is an example of how an ignorant fellow can get through the college without being well grounded in the fundamental knowledge of medicine and surgery.

Dr. J. F. Thompson said it was gratifying to compare the dentists of to-day with those of forty years ago, and see how much higher is their present status, in comparison with the medical profession, than it was then. At that time the medical profession did not look upon dentists with much favor; now we meet as a section of the first Pan-American Medical Congress, and we must sustain ourselves on that high plane. We must educate our young men so they will honor the profession, and in this connection the preliminary education is of the utmost importance. When we look around, and find that almost every state has passed laws to protect the profession and the people from illegal practitioners, we realize that the profession of dentistry is one worthy of being a member of, and we should see that as far as we can control it every one shall be fit for the profession before he is allowed to enter it.

Dr. Fletcher was in accord with any movement intended to raise the standard of preliminary fitness for students. He said there was no excuse for any one to try to enter the profession unless his mind had been so trained that he could reason and think of things in an abstract way. The mind was like the muscles of the body, in its need of training before it could do any important work. He hoped the day would come when no student of a dental school would receive a diploma until he was examined by some board of undoubted qualification and disinterestedness, and his knowledge and fitness passed upon.

Dr. E. S. Talbot said that in the state of Illinois dental matters were in a bad way. Any man who wished to practice dentistry there

could do so, and there was no one to prosecute him if he was not qualified. He spoke of the ease with which a dental college could be established in Chicago; said that some twenty-eight had already taken out charters. He did not know how many were now running, but thought six or eight. In some instances, the professors in these colleges are men who themselves never had a degree, but received them at the close of the course. The consequence is that no place in the world is so overrun with incompetent dentists as Chicago. He felt safe to say that over half his new patients, for the last five years, were those who had their mouths mistreated by these incompetents. The legislature will not pass a satisfactory law, for the colleges do not want such a law. The thing to look forward to and to work for is to get a uniform law in every state. The laws passed by the states of Wisconsin, Minnesota, and New Jersey are good. A man going to any of these states to practice would have to pass an examination, and if he failed, it would throw discredit on the institution from which he graduated. If there were such a law in all the states, it would enable us to regulate the colleges.

Dr. Carr said that three years ago students from two or three colleges had failed to pass the examination before the New York State Board. Soon afterward representatives from faculties came to us, and wanted to know just how high our standard was to be, so they would know what their students would have to be able to pass. It would soon bring a college into discredit if their students did not pass the examination of a fair and honorable State Board of Dental Examiners.

Dr. Noble said that by the law of the District of Columbia a man who comes here to practice must have a diploma from a college that gives three full years of instruction.

Dr. Williams Donnally said that he thought the only way to remedy the present evil of insufficient education among the dentists was for the profession to take hold of it, or some branch of the profession. Probably the best way is by means of the state boards. Congress cannot pass an interstate law regulating dentistry, but if we could get the state boards of the different states to work together, the states might be got to do it. The colleges would see that their interests are favored by a strong law requiring a high educational qualification.

Dr. Thompson said the only way such a state of affairs as Dr. Talbot described as existing in Illinois could be remedied was by concerted action on the part of the best men in the profession. By this the status of dentistry could be placed on as high a plane there as in any other state. In Virginia they had an excellent law, which required an examination by the state board of every one who desired to practice in the state; and the examination was of such a character that it made the students who had graduated from the colleges tremble when they returned to practice in Virginia. It took twenty-five years of effort to get this law passed, and he thought that the same effort would get the same result in Illinois.

Dr. W. H. Potter, of Boston, thought that the examining boards were not the best means to bring up the standard, but that the schools must do it. In Massachusetts the examining board is far more lax than the schools. The trouble is that the board is more or less influenced by politics. A good preliminary education is of the utmost importance; without this foundation it is folly to expect a fine super-

structure. The profession needs educated men,—not only professionally educated, but generally educated.

Dr. Williams, in closing the discussion, said he was glad to have heard such a unanimous expression of the belief in the necessity of the preliminary examination. The knowledge of the principles of medicine and surgery was important for orists, but it was very discouraging for a teacher to try to get such knowledge into the head of a student who did not have a good preliminary knowledge and education.

What should be exacted of the schools was the teaching of the principles of medicine and surgery, and impressing on the minds of the students the value of these principles in their application to the practice of oristry. Forty years ago or more it had been impossible for one to get an opportunity to study dentistry in a reputable office, unless he agreed to take a full course of medicine. This, it seemed to him, was as it should be always.

Discussion closed.

Dr. M. F. Finley read the following paper by Dr. R. R. Andrews :

EVIDENCES OF PRE-HISTORIC DENTISTRY IN CENTRAL AMERICA.

Perhaps one of the most interesting exhibitions of pre-historic dental work that the world has ever known may be seen within a few months in the Central American exhibit of the Peabody Museum at Cambridge, the result of a recent exploring expedition at Copan, Honduras. This collection is fast being put in order, and will soon be on exhibition. It seems particularly fitting that a brief description of this work should be given at this meeting,—the dental section of the first Pan-American Medical Congress,—showing as it does the skill of the workmen of Central America, who did the work over a thousand years ago.

In the report of Mr. M. H. Leville, one of the explorers, it is stated that the party found forests growing over the site of their exploration ; that workmen had to cut down these forests, and then the excavations began. A very large temple was unearthed, and near this the homes of the former occupants. Tombs were found under the floors of what appeared to be the living-rooms, and it would seem that these tombs were built before the house was built, in the foundation, for the purpose of burying their dead. The contents of some of these tombs, with the exception of the various small ornaments that were found within, consisted of only particles of the former skeleton, and only the crowns of the teeth covered by enamel. All the rest had turned to dust from age. In some of them the teeth, roots and all, were fairly perfect. Many of these teeth were found to be filled on the cutting-surface, from the center toward the mesial surface, forming a notch as though the shoulder had been cut in the teeth, and this was quite deep, running one-third up the length of the crown. This was found also in the lateral incisors and cuspids, but not in the bicuspid or molars. It would seem that the teeth of the men were filled in this way, while the women's teeth were filled in three points, deeply filled and beautifully polished. In the teeth of the men, as a mark of distinction perhaps, a hole was drilled and a

piece of green jade inlaid. This piece was circular and beautifully polished, and inlaid in the hole that had been drilled or bored in the front surface of the enamel. These inlays varied from one-eighth to three-eighths of an inch in diameter. In one of the teeth, the left upper cuspid, there was a circular piece bored out of the enamel, making a hole three-sixteenths of an inch in diameter and one-sixteenth of an inch in depth. It has no setting, but there are traces of a dark red cement material still adhering to the sides of the hole, and this material may have been hardened and used as an ornament instead of jade. These teeth are all more or less covered with a deposit of tartar, showing that after taking all the trouble to ornament them, they were apparently never cleaned. In this collection of jade inlays there are perhaps a dozen in perfect condition, and although they were put in over a thousand years ago, and with the rudest implements, the work would be considered a credit to the most skillful workman to-day, with all the modern appliances for this kind of work. I carefully examined these specimens with a magnifying glass, and the fitting was very perfect. In most of these the cement had kept the setting in place in the most perfect manner. In two or three of them the piece of green jade was loose, so that it and the cavity in which it fitted could be carefully examined, and so could be seen how perfectly one fitted in the other, only a little film of some kind of a white cement separating the tooth. In no cases could I find any traces of decay around the inlays, although some of them had been in place a long time during life, as is clearly shown by a thin film of tartar covering the surface of the enamel. Is not this the first record of an inlay, having been placed there over a thousand years ago?

With the description of one other specimen I have done. This is by all means the most interesting of all these specimens from Copan. It is a superior left lateral incisor, made from some kind of a fine dark stone, taken with other teeth which had inlays from one of the skulls found in a grave there, and Mr. Leville, who found it, assures me that it was taken from the socket of the inferior left lateral incisor, where it had been implanted for over a thousand years. There were no bands or anything of the kind to hold it in place, but that it had been in place and in use is clearly shown by a considerable deposition of tartar upon it. But for its color it would be a very fair representation of a lateral incisor, the root being smooth and rounded, like the root of a tooth. I have no doubt that this is the earliest case of implantation on record. The entire collection from this exploring expedition in Central America is one of very rare beauty, and it would well repay a visit to the Peabody Museum in Cambridge.

On motion, a vote of thanks was extended to Dr. Andrews for his contribution.

Dr. W. H. Potter read the following paper :

THE DISCOVERY OF THE ANESTHETIC POWER OF ETHER.

The progress of modern dentistry has been so rapid, and its attainments so notable, that there is danger that we—at least those of this

generation—forget the important services rendered by those in our profession working nearly fifty years ago.

A wonderful stimulus was given to surgery by the discovery of the anesthetic power of ether, in 1846.

The discovery was made by a dentist, Dr. W. T. G. Morton, of Boston. In order to fully appreciate the honor which this discovery casts upon the dental profession, it is well to review the circumstances under which it was made.

Fifty years ago the dental profession was largely occupied in furnishing good substitutes for the natural teeth. Vulcanite was not in use, and all dentures were mounted upon gold plates.

On account of the pain accompanying the extraction of teeth, it was then the custom—at least in many cases—to leave roots in the mouth, and fit plates over them.

It was also the custom to use a very low-grade solder in attaching teeth to the plate. This solder, from its admixture of base metal, was unpleasant to the taste, and the method of fitting plates over remaining roots was uncleanly, and resulted in an ill-adjusted denture. In order to remedy these defects, Dr. Morton betook himself to careful study and experiment. He soon discovered the possibility of using a high-grade solder, and thus abolished the disagreeable effects connected with the solder heretofore in common use. But how to get rid of the roots, which interfered with the fit of a plate, was a question not so easily solved.

It was Dr. Morton's experience that patients who had been accustomed to the insertion of plates without the removal of roots would not readily submit to their removal, even though it assured in the end a far more satisfactory result. It was the difficulty which Dr. Morton experienced in persuading his patients to submit to the pain of tooth-extraction which incited him to find some way in which that pain could be abolished. His desire to perfect a process in mechanical dentistry originated his efforts in behalf of anesthesia. Doubtless, as time went on, the extended applicability of an anesthetic agent was constantly before his mind; but it is interesting to note just what necessity started his inventive mind in courses destined to accomplish a widespread good.

Although complete surgical anesthesia was unknown before Dr. Morton's discovery, a partial insensibility had, in various ways, been produced. The virtues of alcohol were known, and its power to diminish pain when given in extreme doses. Opium was often used in large quantities before a severe operation. Nitrous-oxid gas had been experimented with, but mainly in order to produce an interesting state of excitability. Hopes were entertained that it might be a reliable means of abolishing pain. Ether had for a long time been used by inhalation in cases of spasmodic asthma, chronic catarrh, whooping-cough, and to relieve the effects produced by the accidental inhalation of chlorin gas. It had also been used, as had nitrous-oxid gas, to produce exhilaration or intoxication. There was, however, no agent which could be relied upon, even to greatly diminish the pain of surgical operations. Dr. Morton's zeal in the pursuit of anesthesia soon led him to realize that he lacked the knowledge necessary for the investigation of a subject so intimately connected with medical science, and, in order to fit himself for the work in hand, he entered

the Harvard Medical School in the fall of 1844. It was in attendance upon the exercises of this school that he first met the men before whom he was destined soon to appear with his claim as the discoverer of surgical anesthesia. In the wards of the Massachusetts General Hospital, and at its operating theater, Dr. Morton received renewed incentives for the work constantly in his mind. While the pain of dental operations needed relief, it was insignificant to that attending the operations of general surgery.

The history of Dr. Morton's experiments with ether is as follows: As early as July, 1844, at the suggestion of Dr. Charles T. Jackson, he used chloric ether locally to allay the pain of an aching tooth, and produced not only an alleviation of pain in the tooth, but a numbing of the surrounding parts. If ether could act locally as an anesthetic, why could not it act generally and with profounder impressions? Such was the train of thought started in Dr. Morton's mind by the use of ether in the aching tooth.

About this time Dr. Horace Wells, of Hartford, Conn., was experimenting with nitrous-oxid gas, having become interested in its properties by the public exhibitions of Colton. In these exhibitions various stages of excitability and hallucination were produced, which served to amuse a public audience. It occurred to Dr. Wells that nitrous-oxid gas might be used to produce insensibility during tooth-extraction, and he submitted to the influence of the gas while Dr. Riggs, of Hartford, Conn., extracted for him a tooth. The operation was declared to be without pain, and Dr. Wells believed that a new era in tooth-extraction had arrived. His subsequent experiments, however, were unsatisfactory, and the idea of producing anesthesia by nitrous-oxid gas was abandoned for several years. But though the experiments with nitrous oxid were unsatisfactory, yet they served to stimulate Dr. Morton in his efforts to produce a complete anesthesia with ether. His first experiments were with animals, a hen, a gold-fish, and a pet spaniel having served as subjects.

The effect of the drug was evident in these cases, a stupefaction and a certain degree of insensibility being produced. Dr. Morton also took ether himself, and produced a state of unconsciousness which seemed to offer immunity from pain. The best method of administering ether was an important question in Dr. Morton's mind, and a complicated apparatus, such as was used for nitrous-oxid gas, was taken into consideration. In pursuing this detail of the subject, Dr. Morton sought the advice of his friends and acquaintances whose knowledge seemed likely to be of benefit. Among others, he consulted his former instructor, Dr. Charles T. Jackson, a professor of chemistry in the Harvard Medical School. Dr. Jackson gave him the benefit of his knowledge as to apparatus, and also gave him very valuable advice as to the necessity of using pure sulfuric ether, and as to where it could be obtained. On September 30, 1846, Dr. Morton administered ether to a patient in his office, and extracted a tooth without giving the slightest pain. The ether was administered on a handkerchief, and the result was so satisfactory that this operation can be considered as establishing the anesthetic power of ether in a minor operation. In order to show the efficacy of ether in the full range of surgery, Dr. Morton applied to Dr. J. C. Warren, of the Massachusetts General Hospital, for permission to administer his anes-

thetic to a patient about to undergo a surgical operation. Dr. Warren entertained the proposition at once, and although not acquainted with the true nature of the anesthetic agreed to try and furnish an opportunity for putting it to proof. The readiness with which Dr. Warren granted the request of Dr. Morton is significant as showing that Dr. Morton had established for himself a reputation not only in the profession, but as a student in the medical school. If this had not been the case, it is inconceivable that Dr. Warren should have so quickly lent his ear to a proposition which was at once bold and surrounded with danger. The first surgical operation under ether was performed at the Massachusetts General Hospital by Dr. Warren, October 16, 1846. It consisted in the removal of a tumor from the under side of the lower jaw. The patient declared that he had experienced no pain, but only a sensation as if the part had been scraped with a blunt instrument. It was evidently a case of incomplete etherization, and this cannot be wondered at when we consider the method of its administration. The inhaler consisted of a glass globe large enough to hold a fair-sized sponge. The globe had an opening at the top, through which the sponge was introduced, and by which it was moistened with ether. To another opening at the side was attached a short tube which led to the patient's mouth. Subsequently a valve was introduced into the mouth-piece, in order to regulate the supply of outside air. Although the success of this notable etherization was not complete, it was still so pronounced as to convince all present that a useful discovery was at hand. No such removal of pain had ever before been accomplished. Though every sensation had not been removed, practical anesthesia had been produced.

But would ether suffice to prevent pain in a capital operation?

This was a crucial test, and one which Dr. Morton was eager to try. It was not until the 7th of November, 1846, that an opportunity was given. On that day the thigh of Alice Mohan was amputated at the Massachusetts General Hospital without pain, through the influence of ether, and its anesthetic power was established to the complete satisfaction of the surgeons who witnessed the operation.

A new era was thus ushered in by the advent of painless surgery. It is not probable that the dental profession will ever again bring forth a discovery which will so make for the welfare of humanity as did Dr. Morton's. In his distinguished career several important points deserve attention. In the first place, it is to be noted that when Dr. Morton wished to make a decided advance in the dental profession, he at once felt the need of a more thorough study of general medicine, and only by devoting himself heartily to its study was he able to arrive at the desired results; and to-day advance in our profession must be looked for along the same lines. We cannot be true specialists without being thorough generalists; and in asserting that a thorough knowledge of medicine and surgery is necessary for a dentist, I do not mean a mere theoretical knowledge of these subjects. We should walk the hospitals, and see the cases, as did Dr. Morton. How else can we know what disease and its remedies really are? How else can we get the broad views which are necessary if we are to be wise and competent operators in the oral cavity? However much theoretical medicine the dental student of to-day may know, he does not know the cases as does the medical student. Is it not probable that one

reason why Dr. Morton was so readily accorded the opportunity to test his new discovery in the Massachusetts General Hospital was his having been present there as a student? Because mere manipulative skill without a broad and thorough medical education can do so much in establishing a dental practice, there is danger that the profession rest content with the training up of mere artisans, having just enough medical knowledge to save them from serious errors. It is from a union of broad medical education and great manipulative skill that we are to expect notable advances in the dental profession. From constant work in the oral cavity the dentist acquires a mechanical skill which is beyond what the general surgeon can hope to attain in the same territory.

Let thorough medical education be joined to the dentist's highly trained mechanical skill, and brilliant work can be looked for in many of the operations in the oral cavity which are now performed by the general surgeon.

Our dental schools should have clinics for the practice of oral surgery; this to include not only operations on the teeth, but also on any and all the tissues in the oral cavity. I do not argue that every dentist should practice the full range of oral surgery, but I do claim that every dentist should have sufficient medical instruction to readily adopt the more enlarged sphere of action, should his tastes and opportunity favor such work.

Another teaching from Dr. Morton's life is that mechanical dentistry should not be despised. His reputation was first gained as a maker of artificial plates, and as a skillful adjuster of artificial vela and appliances for restoring impaired facial members. His skill in the latter direction gave him much reputation, inasmuch as the work was of a more unusual nature than that of making plates, and required a greater degree of manipulative skill. Who would imagine that from a desire to perfect the details of an artificial plate, experiments would be undertaken which would result in the complete removal of pain from surgical operations? Yet such was the case, and the dental laboratory must evermore be honored as the birthplace of an idea which ranks with the greatest discoveries of the age.

Although Dr. Morton's claim as the discoverer of the anesthetic power of ether is now quite generally allowed, there were times when rival claimants tried to take from him the honor which should have been his. Dr. Morton had little uninterrupted satisfaction or substantial profit to reward his work, and this was largely due to the mistake which he made when he decided to patent his discovery. Had the discovery at the first been given to the public, its reception by the medical profession would have been with much less suspicion and with much greater honor. Such were the apparent profits to be realized from the discovery, that the granting of a patent conveying exclusive right to the discoverer stirred up endless controversy as to originality, and resulted in great financial loss. From this experience of Dr. Morton's can be learned the final lesson of this paper. Whatever important inventions may originate in our minds, let us never take them to the patent office. Let it be the pride of our profession to give our best endeavors freely for the good of humanity, knowing that they will receive in the end a just reward.

Discussion.

Dr. H. B. Noble said that while listening to the paper, and remembering the inaugural address by Dr. Shepard before the Columbian Dental Congress, it occurred to him to wonder why two such papers—reviewing an old issue which he thought had been entirely and satisfactorily settled long ago—should have been written. He said, from a close personal acquaintance with Dr. Morton, and the knowledge he had gained from his brother, Dr. Lester Noble, who was a student and present in the Massachusetts General Hospital at the time Morton administered the ether for Dr. Warren's operation, and a good general knowledge of all that had been said and written upon the subject, he was convinced that while Morton deserved the credit of introducing ether-anesthesia into dental and surgical practice, his claim to having discovered its anesthetic qualities was not founded upon the truth. The fact that he included Dr. Jackson with himself as a co-inventor proved that he could not claim to be the sole inventor.

Dr. Potter said that the credit for the original invention of many very valuable ideas was, and always would be, in dispute; but he thought the undisputed fact that Morton made the use of ether known, and introduced and pushed its use in dentistry and surgery, entitled him to great credit. We know that ether had been made previous to his use of it, but it had never been used as an anesthetic in surgical operations.

Dr. Williams. In regard to the subject under consideration, I wish to make a statement of some facts in regard to the origin of the practical application of anesthesia in surgery.

That sulfuric ether was repeatedly used as an anesthetic by Dr. Long, of Athens, Ga., in his surgical practice, about 1840, seems indisputable from the reliable evidence collected and published by the late Dr. Marion Sims, of New York, a few years ago.

The fact that Dr. Long did not publish its use to the world does not affect its priority. Next comes, about four or five years later, experimental discovery and practical application by Dr. Wells, of Hartford, Conn., of the anesthetic effects of nitrous-oxid gas. Then some facts (known to me, as I was behind the scenes). About a year later, Dr. Morton, remembering that Dr. Wells had faith in anesthesia by inhalation of something, applied to Dr. Jackson, who informed him that from his (Dr. J.'s) personal experience sulfuric ether had relieved his suffering from the accidental breathing of chlorin gas, adding a caution in regard to its use. Dr. Morton, finding Dr. Jackson's information correct in regard to the "lethal" effects of sulfuric ether, by persuasion induced Dr. Jackson to unite with him in procuring a patent to control its use. Dr. Jackson's medical friends reminding him of the breach of ethics in getting such a patent, he withdrew from the project. It was then that Dr. Morton claimed the sole discovery of ether-anesthesia, and, wishing to have some respectable backing, he went to Dr. John C. Warren, the head of the surgical staff of the Massachusetts General Hospital, and said in his persuasive way that he had discovered a "compound" he called "letheon," that would prevent pain in surgical operations, and he would be pleased to show its effect on some hospital patient. Dr. Warren consented to the trial, which proved successful; but he with the rest of the staff declined to indorse or adopt it unless they knew what it actually was.

Of course Dr. Morton had to tell them that it was sulfuric ether. They then began its use, and it was their indorsement which gave it the successful start in the surgical world, without which it is very probable it might have fallen into the list of empirical fancies.

The summing up of these facts seems like this :

Dr. Long's successful private practice, followed after several years by Dr. Wells's success, which his diffident nature hindered him from pushing to notoriety. Then Dr. Jackson's information to Dr. Morton, which he followed out, and brought to the notice of the surgical staff of the Massachusetts General Hospital, which staff, having eliminated its elements of quackery, tried effectually, and with their substantial indorsement gave it to the world. To that indorsement it surely seems is due the permanent consideration that anesthesia has since received.

Dr. Taft said he had been personally acquainted with Dr. Morton ; had seen him administer ether frequently, and usually successfully. He had also made himself familiar with all the literature of the subject, and the statement of Drs. Williams and Noble agreed with what was generally accepted as truth at the time.

Subject passed, and section adjourned till to-morrow.

(To be continued.)

NEW JERSEY STATE DENTAL SOCIETY.

THE twenty-fourth annual meeting of the New Jersey State Dental Society convened at the West End Hotel, Asbury Park, N. J., on Wednesday, July 19, 1893 ; the president, Dr. Oscar Adelberg, presiding.

The meeting was opened with prayer by the Rev. Dr. E. L. Stoddard, of Jersey City.

After the transaction of usual routine business, the president read his annual address. He referred to the great amount of good work which had been accomplished in the meetings of the society, which had been held, with but one intermission, at Asbury Park since 1883, dwelling particularly upon the fraternal spirit and *entente cordiale* which had been the outgrowth of the social and professional relations established through the several meetings, not only as regards the members of the New Jersey State Society, but among those members of the profession in neighboring states who had been in attendance from time to time. One development of this fraternal spirit had been the holding of two annual meetings in conjunction with the State Dental Society of Pennsylvania, upon both of which occasions most fruitful results, both in point of interesting papers and discussions, and in fraternal spirit, had been achieved. He spoke feelingly of the loss sustained by the society in the death of Dr. Frederick A. Levy, by which the society was deprived of one of its most honored and prominent members, one who combined rare qualities of heart and mind that endeared him to all who came into contact with him, and endowed him with quick perception and ready and efficient executive ability. The death of Dr. W. F. Rehfsuss was another loss to the society. "He was one of the brilliant younger lights of the profession," one who gave much promise of great usefulness.

The effects of the state dental law of New Jersey were cause for much satisfaction. The defeat of a measure, during the session of the last legislature, ostensibly to amend the law, but actually aimed at its abrogation to a considerable degree, was most gratifying.

While there has been, so far as his knowledge went, no case of prosecution, still the salutary effect of the thorough preparation necessary, and the rigid examination conducted by the efficient examining board, is visible on all sides in the superior *personnel* of those seeking license at its hands, and the improved standard of operations at the hands of licensees coming under our immediate observation. He called attention to the activity of the Central Association of Northern New Jersey, started as an adjunct to the state society, and commended its success in maintaining an active interest upon the part of its members and visitors by the attractive character of its bi-monthly meetings.

In concluding his address, the president alluded to the part which New Jersey had taken in initiating the movement which had led to the holding of the World's Columbian Dental Congress, and in the light of this urged upon the dental practitioners of that state the duty which he believed lay plainly before them of doing all within their power to contribute to the success of that Congress,—“a meeting which marks an epoch in the history of dental science, and is calculated to raise the plane of our profession, as a profession distinct and independent from any other, and show to the world represented there what is meant by the term ‘American dentist.’”

Discussion.

Dr. R. M. Sanger. Gentlemen, the president's address before us I have listened to with a great deal of pleasure. It deals with generalities, and I do not propose to go into them in detail; but I want to lay stress upon that part of it referring to the Columbian Dental Congress. We cannot feel too strongly the important position that the society holds in the matter of that Congress. The New Jersey State Society cannot afford to pass it over lightly, and members should not, because they find it impracticable to be there individually, neglect to give it what aid they can in other ways; but let us rather feel that as the projectors of this grand convention we are under obligation to father it until it is an assured success. If we are not able to go to Chicago, we cannot for that reason afford to be without the proceedings of the Congress; we can subscribe something, and procure the records, which will be of great value for future reference.

The secretary then read the following report:

FRED. A. LEVY, D.D.S., born at Richmond, Va., died at Orange, March 20, 1893.

At a special meeting of the New Jersey State Dental Society, the following memorial and resolutions on the death of Dr. Frederick Arthur Levy were adopted:

WHEREAS, In the death of our esteemed associate, Dr. Frederick A. Levy, the New Jersey State Dental Society has lost one of its most worthy and honored members, full of generous impulses and kindly professional feeling. He was foremost with those who labored to advance the profession by filling its ranks with honorable and capable men. He was a devoted professional brother, sociable, kind, and charitable to an eminent degree. Therefore be it

Resolved, That we bow to the will of Almighty God, and yet desire to

emphasize our grief in the death of our professional brother, and to bear testimony of his abilities and self-sacrificing spirit in the advancement of his profession. Also,

Resolved, That a copy of these resolutions be spread upon the minutes of our society, and that a copy be sent to the dental journals for publication.

C. W. F. HOLBROOK,	} Committee.
R. M. SANGER,	
J. A. OSMUN,	

Adjourned until 8 P.M.

Evening Session.

The president, Dr. Oscar Adelberg, in the chair.

Dr. N. T. Shields, of New York, spoke on the subject of scientific root-filling, as follows :

Mr. President and Gentlemen : When it is necessary to destroy the pulp, instead of making an application directly upon the pulp itself, I apply the arsenious acid indirectly. A tooth is a microscopical structure. The dentinal fibrillæ are 1-3000 of an inch in diameter ; and by making the application of arsenious acid not at the place of exposure, but upon another part of the tooth entirely,—make the application of arsenious acid upon a spot of freshly exposed tooth-structure, and hermetically seal with gutta-percha, make an application of cocain to the part of the tooth where the exposure is, and the patient will leave the office perfectly comfortable, and the pulp will die without the patient being conscious that the thing is being done. Leave the application one week, and at the expiration of that time you are able to take a sharp bur and go farther into the dentine, almost to the pulp itself, without one particle of pain ; then make a fresh application of arsenious acid, and hermetically seal it up with gutta-percha, and leave it for another week, and the pulp will be perfectly dead, without the slightest inconvenience to the patient, save about the tenth day it will be abnormally sensitive to heat and cold. If the patient takes hot water or hot coffee, and it creates toothache, the way to avoid it is not to allow the hot coffee to touch the tooth. Tell the patient to look for this sensitiveness two or three days after the second application. At the first symptoms of sensitiveness the patient will avoid hot drinks ; and if he does take hot soup or hot coffee, the toothache so brought on can be readily relieved by the application of cold water.

By applying the arsenious acid in this way not a particle of it comes in contact with the pulp itself, and hence there is no soreness caused at the end of the root by the acid being absorbed through the foramen. At the expiration of the second week the tooth is ready for the operation of removing the pulp and filling. I always open these teeth with large burs. You can remove the enamel with heavy excavators, but always open the tooth itself into the pulp-chamber with a bur, never with an excavator, because if you should open into the pulp-canal with an excavator, you would probably fill the canal with chips of hard tooth-structure, that would give you a little trouble to remove. You can remove the chips, but it is not necessary to get into that trouble.

There are eighteen teeth ; two first bicuspid, six upper molars, six inferior molars, and four inferior incisors ; eighteen teeth altogether in the human head which, if the pulp should happen to be exposed

by decay or otherwise, it is admitted almost over the whole land to be an impossibility to remove the pulp and fill the canals. All of you know that ; the journals are full of it. It is something that we come in contact with daily ; therefore it is one of the most important difficulties that our profession has to overcome.

I have on the table here a package of Donaldson's pulp-canal cleansers, No. 5, and with those instruments, as you saw to-day, I can enter any root-canal in any tooth. I can invariably fill any root-canal in the human head, and you can do the same thing. I can with ease, ninety-nine times out of one hundred, go directly to the apex of any of these eighteen difficult roots that I have mentioned.

Once in a hundred times we come across a canal that we have a little difficulty in entering, but I have never yet seen the canal that will take me over an hour and a half to reach the apex of the root. Are you going to be guilty of the unprofessional conduct of saturating a piece of cotton with an essential oil, and filling over that with cement, and then tell your patients they are liable to have toothache in that tooth at any time, and if they do they must call on the nearest dentist, and all there is to do is simply to remove the cement and remove the cotton and the toothache will be relieved? That mode of procedure has been published in the journals not over three months ago as being dentistry from a scientific standpoint. You can read that in the *Cosmos*, not over three months ago ; and it came from a place of great responsibility, the responsibility of the starting-point, the dental college. It is in your *Cosmos*, and you can read it. I am willing to go upon record as saying that any man who places cotton, saturated with an essential oil or saturated with anything else, at the apex of a root, or in the body of the tooth, and looks upon it as a permanent operation, or as the best that his profession can afford for a temporary operation, is practicing nothing but diabolical quackery. There is no man in this room who cannot take one of Donaldson's nerve-instruments, and go up into the bifurcated root-canals of the first bicuspid of any patient. Turn to your *Cosmos* and other dental journals, and you will see the scientific practice in root-filling ; attend any society meeting in the country, and you will find out how they save these teeth without filling the buccal roots.

All operations done in the mouth by dentists come under the head of minor surgery ; and surgery is not based upon guess-work. I do not guess that I can cut that man's leg off ; I know I can cut his leg off. When we know that we have inserted an instrument in a root a certain distance, we can measure that distance exactly ; there will be no guess-work about where the apex of the root is, for we can measure it exactly. First, take a bur and open the tooth well ; do not leave a projecting piece of enamel. I hear dentists say they do not like to cut away the dentine, because it weakens the tooth so much. But what good will the tooth be to the patient if the roots are not filled? You might just as well have no tooth. Cut away sufficient to have the canal laid open as plainly as the palm of your hand ; leave no obstacle in your way ; and you will then be able, ninety-nine times out of one hundred, to take a Donaldson nerve-instrument and pass it to the apex of the root. The instrument will most of the time be tight. You will extract the pulp first, then place the instrument back in the root, where it will be somewhat tight, and use

an upward and downward motion, which will slightly enlarge the canal. You do not enlarge it in one place only, but universally from the base to the apex. After you have enlarged the canal in that way, you can take an instrument a little bit larger than a No. 5, which is the smallest, and that will be tight when first inserted; move it up and down as in the first place, and it will again make the canal a little larger. Then take a still larger instrument, perhaps a No. 4 Donaldson nerve-canal cleanser, and repeat the operation. If you have difficulty in reaching the apex, never abandon the effort, but persevere until you get there if it takes you a month. You can invariably do it.

We sometimes find a root that is almost twisted twice upon itself,—a root curved most tremendously, as we see them at the college museums. We do not meet them in daily practice. Are you going to practice quackery all your life because somebody has had or may have a tooth with such a crooked root? You may have seen those terribly crooked roots, where the tooth almost turns backward. If you persevere with these instruments, you can reach apices of these roots and enlarge the canals to any size you may desire. Before you begin the enlargement of the canal, take an instrument with a piece of rubber-dam attached, and insert that small instrument to the apex of the root, and the bit of rubber-dam on the instrument will indicate exactly the length of the root-canal. When you come to enlarge the canal, the instrument will cut the tooth-structure into chips and powder, which will obstruct the canal, and when you then reinsert the instrument you will find that the rubber-dam indicator does not come up even with the tooth as it did before, for the reason that the canal is partly filled with broken-down tooth-structure. Always keep that little indicator with you until the operation is completed. After you have the root reamed out with these Donaldson root-cleansers to the apex, then you take an instrument that was intended for extracting pulps, a Donaldson's nerve-extractor, which has a hook on the end of it; you can never extract a pulp with that,—you cannot get it into the canal; but take a pair of nippers and snip off the hook, and it gives you the best root-plugger in the world; flatten the end of that instrument, and you have a point that is unequaled by any other instrument made for root-filling. Then take soft gold, not a plastic material, but soft gold foil, cut in very thin strips not wider than the thickness of a pin-head, fold that once, and cut that little fold into very small pieces, not larger than half the size of a pin-head; then take up with your measuring instrument a very small piece of gold, and, with a steady hand, you can carry that directly to the apex. If it should stop by the wayside, and not go to the apex, your little rubber-dam indicator will show it; or if it goes to the apex, as it generally does, it will be indicated by the bit of gold occupying a space its own size at the end of the root; the rubber-dam will not quite come in contact with the root, because the piece of gold stops it. If the bit of gold should happen to stop half-way in the canal, the rubber-dam indicator tells you that it has not reached the end; and in that case take a Donaldson nerve-canal cleanser and go into the root and remove the piece of gold. Take up another piece of gold and carry that to the end. You have the rubber-dam indicator all the time before you, so that you can measure and calculate the distance the gold is carried every time.

Gentlemen, if you take this home with you, you can practice it yourselves with arithmetical exactness, filling to the apices all these difficult roots, and larger ones in the same way, but easier, with gold. After the apices are filled with gold, you can, if you choose, finish filling the root with a very fine cement. It is not necessary to fill the whole root with gold unless you so desire.

A word about plastic fillings. When a tooth is filled with a plastic material, instead of in this way with gold, we can only draw the line between the scientific and the unscientific method by relating both. Suppose one is a chloro-percha filler, and he has the chloro-percha beautifully dissolved, and the root beautifully dry, and everything perfectly favorable to the chloro-percha going to the apex of the root; what indication is there that the chloro-percha filler depends upon for assurance that the chloro-percha has reached the apex of the root? He pumps in the chloro-percha until the patient flinches, and he says that means that the filling has got to the end. There never was a greater wrong. You can take this chloro-percha and put it in the mouth of the root, and press it and press air into the canal, and you will get the same flinch from the patient. The fact that the patient flinches is no indication that the gutta-percha is at the apex of the root; they flinch from air-pressure just the same. When you fill a root with gold you do not have to guess that it is right; you do not say, I guess it is filled, I guess it will last. If a man uses oxychlorid, or any plastic material which cannot be subjected to accurate measurement, the principle is exactly the same as with chloro-percha, and the result will be equally uncertain. When you are dealing with solid materials that have to occupy a certain space, then you can tell scientifically just where your filling is; but if you handle plastic materials, you will never be able to positively state that you know the filling has gone to the apex, because it cannot be accurately measured and its situation ascertained. Have you any direct measurement by which you can ascertain whether the oxychlorid you place in a root-canal has gotten to the end of it? No, you have not.

Gentlemen, I have gone over this ground carefully, and I have tried to emphasize minutely every point. I want to leave ample time for discussion. Turn over what I have said and pull it to pieces, because whenever the truth is brought in contact with error it likes the contest; but when a thing is doubtful it prefers a shadowy atmosphere.

Discussion.

Dr. B. F. Luckey. Mr. President, it has been a great pleasure to me to listen to Dr. Shields. When he started out I expected fully to receive some new light upon the subject that would be of interest and value to us, but I do not see that there has been anything new presented to us. He has not told us of a single thing that has not been told us time and again by different men. The measurement of a root, which he lays so much stress upon, is many years old; every man in this room, probably, has heard Dr. Atkinson say the same thing time and time again, except that he did not use a piece of rubber-dam on an instrument; otherwise it was the same thing exactly. Filling the roots of teeth with gold is as old as dentistry; and as to using small instruments to introduce the gold, he could not get it there with anything else.

I have listened to the gentleman carefully, and I can indorse about all that he says, but I feel a little disappointed that I have not gotten some new points. The one thing that looks to me a little overdrawn is his statement about getting absolutely to the end of the roots of those very much twisted molars. I have seen many teeth with roots wound around themselves in such a way, and standing at such acute angles, that to my mind it has seemed, and does seem now, absolutely impossible to get any instrument into them. The doctor says it is feasible and practicable, but the only way to test the thing is to do it out of the mouth and then cut the tooth open, or to do it in the mouth and then extract the tooth and cut it open, and that is not allowable. I do not think it possible, even with these Donaldson instruments, which are the acme of all pulp-canal instruments. The Donaldson instruments, like all other attenuated instruments, will occasionally break. Their temper is not always reliable. Some of the little No. 5 instruments can be used for a long time and will seem almost unbreakable, while another one, taken from the same package, will break on the slightest catch in the root, and the point will be torn away; and if the point be broken off beyond a slight turn in the root, it is next to impossible, if not absolutely impossible, to get the point of that instrument out; and if the point be left in there, with a considerable amount of pulp-tissue beyond it, it does not take a prophet to bring to your mind what the probable result will be. The practice of filling the apices of roots with gold has been tried for many years, and by the majority of the profession, if we may rely upon their writings in the journals, has been abandoned for what has appeared to them to be a better mode of procedure, the use of chloro-percha. In cases where the opening at the apex of the root is large, gold is thoroughly inadmissible. In those cases nothing has presented itself which seems to be so reliable and easily tolerated by nature as chloro-percha; and the same system of measurement can be used as with gold.

Dr. William H. Trueman. I have listened with a great deal of attention to the doctor's remarks. I look at the matter of root-filling a little bit differently. We have our theories, but we all, I think, admit that the more carefully we remove the pulp from pulp-canals, and the more carefully we fill the canal, the safer that tooth is. I think we are a unit upon that. But we remember that the teeth we work upon are sometimes not only inconvenient to get at, but are situated in very sensitive mouths, and sometimes our ambition is slightly limited by our ability to work under the circumstances in which we are compelled to work. As an illustration of that, I have several cases of devitalized teeth that have been filled for some years, and the pulp has not been removed. They are filled with cotton and sandarac. The filling remained in one case four years; it has been removed once. No attempt has been made to take out the pulp. Simply a little cotton and sandarac was put in, and it was exceedingly difficult to get even a filling of that kind in. The patient has been an invalid for years, has heart-trouble, and can rarely remain more than fifteen minutes in the chair at one time. In such cases I do not think it would be wise to clean out those roots and take an hour and a half to do it. That is an extreme case, but we do meet with a great many patients who cannot stand that long-continued manipulation. I agree

with the doctor that, with the peculiar manipulative skill which he has developed, and which, probably, we all might display if we were to try, and having patients who could stand the strain, he is able to accomplish all that he has said. I agree with him that it should be accomplished, but there are a great many cases where we cannot do it, through no fault of ours, but on account of the condition of the patients for whom we work. Is it always absolutely necessary to take out the pulp and cleanse the roots before filling? Is a tooth that is not properly and perfectly cleansed before filling always bound to give trouble? I think not. For twenty years and more I practiced filling roots with cotton, saturated with creasote, in all those cases. During the last five or six years I have not done that so much,—I have used gutta-percha more; but I am free to say that the change in method has not produced any very great change in the results. In treating the pulp-cavities of devitalized teeth, whether it is done perfectly or imperfectly, we can never say that the devitalized tooth is safe, that it will never give trouble.

The doctor referred to the surgeon as dealing with an exact science, and as not being justified in stopping short of what is the best to do. In practice I think that hardly holds good. For many years I have read hospital reports in the London *Lancet* and other medical journals, and I have noticed that sometimes the surgeon said, after an operation, "If the patient's vitality was only a little bit better, this result would have been different." We are always limited when working upon a living being. We have an ideal, and the best we can do is to get as near to it as circumstances will permit.

I would not for one moment say a single word that would tend to lower the standard of practice; but we must remember that we are human, therefore limited by the physical condition of the patients in our hands, who sometimes cannot bear long and severe operations. Sometimes, as in the case of which I have spoken, we have to stop short of the best we can do, or might do under different circumstances where we have a fair chance.

Dr. F. C. Barlow. I should suppose that gold ought to be packed at the apex of the root so solidly that it would prevent the absorption of moisture. I would like to know whether it could be packed sufficiently hard with a small Donaldson nerve-extractor. It seems to me that an instrument of that light texture could not pack the gold in a root sufficiently solid to prevent the penetration of moisture.

Dr. James Truman. Mr. President, as I listened to the remarks of our friend I was struck with the fact that the wheel is constantly going round and bringing up to the surface old beliefs and methods. When I was a student of dentistry there was no other process used to fill root-canals except to pack gold in them; it was the old Maynard process, and I have looked many times, with the greatest admiration and pleasure, at Dr. Elisha Townsend working at filling root-canals, in almost precisely the same way as the gentleman has described here this evening, except that instead of a Donaldson broach he used an ordinary broach with the temper undrawn. Now for twenty years I followed the same practice. I think I never filled a tooth where the pulp was removed that I did not fill the canal with gold; and I have spent, as the gentleman who spoke has spent, hours upon hours in endeavoring to reach the ends of the canals. I

can indorse most fully his view that if the canal can be filled with gold properly to the apex, and there being no necrotic condition at the apex of the root, there will never be any trouble from that canal. I have the utmost faith in gold canal-filling; but if the gentleman lives to practice his profession as long as some of the rest of us have, he will find that he has got to work for millionaires or live with an empty pocket. It is impossible, I hold, for a dentist at the present day to spend hours over a root-canal,—first to prepare it, then, as I noticed the gentleman did this afternoon, to slowly pack in small particles of gold. We would never get through with our work. I never got through with mine in those days.

Another point: I think this gentleman, and others who follow that course at the present time, should bear in mind the fact that there is danger of shock to the patient by long-continued operations. They do not seem to take into consideration the fact that they are not working on wood, but upon human beings, whose nervous systems are in a state of tension during these operations. I have no doubt that every man in this room has, during operations of an hour and a half or two hours, seen a dark line come around the eyes of his patient. How many of your patients have gone home, after such operations, to feel for days and weeks the strain to which they have been subjected. That is nervous shock. I have seen patients frequently, in our college clinics, drop in a dead faint, and were only with a great deal of difficulty restored. When the other modes of filling root-canals came into vogue, such as the use of oxychlorid of zinc and chloro-percha, I think we all felt a great relief that we had at last abandoned gold in root-filling, not only for our own benefit, but for the health of the patient; and I would not return to it, for I do not think it is necessary. It is not important that we should at this late day go into a discussion of the different filling-materials that may be used to advantage, whether chloro-percha, oxychlorid of zinc, or what not. The main point is to have the root-canal well filled, because if it is well filled, and there is no necrotic bone around the apex of the root, I contend that a tooth thus managed is as satisfactory as it was before the pulp was destroyed.

Dr. W. P. Richards. If Dr. Shields were to break off the point of a plugger in the canal, as Dr. Luckey spoke of, how would he remove it from a crooked root? I think it is almost impossible to get it out. I do not see how he could remove it, except with a strong acid.

Dr. Ottolengui. Mr. President, Dr. Shields has told us with a great deal of force that he can go to the extremity of any root with these instruments. He started out by telling us how he destroyed the pulp in a tooth, and the natural inference is that he is alluding to teeth from which he has taken the pulp. In the case he described, he told us how to destroy the pulp first, and then go into the canal. Now those of us who admit that we do not or cannot fill all of these canals could, I think, explain our lack of skill somewhat in this manner: A tooth does not retain the same relation of its canals throughout its existence. I am right, I think, in stating that normally the pulp-canals of teeth are constantly growing smaller. If a tooth becomes decayed, there is immediately set up an irritation, caused by the lessening protection of the wall that covers the pulp, which irritation will make the pulp have a tendency to throw out new bone to

build a wall against the encroachments of the enemy, caries. If that tooth be filled with gold, and subsequently, perhaps a year afterward, is found to be abscessed, with or without a fistulous opening, and the dentist then decides to remove that gold filling in order to get at the canal and treat the pulp, he will be surprised, in the first place, to find that the pulp was not exposed, but was merely approached closely at the time of filling, and the shock probably caused its death. Then in the second place, the canal will not be found in the same condition as before ; the canals will be found to have become more thread-like, if not absolutely closed up for two-thirds, or even seven-eighths, of their extent. I treated an abscessed tooth, some time ago, unsuccessfully, and finally extracted it, and I discovered that, starting at the foramen and putting the finest Donaldson broach in from that way, it would barely enter the tooth at all ; and I clipped off section after section of the root until I had got down to a piece so small that I could not hold it in my hand, before I could find any trace of a canal that had not been stopped up. That is an extreme case ; but where the canal is not absolutely closed it is sometimes closed in places, with spaces left between the obstructions. You get into one of those pockets, and you think you have reached the end of the root, but you have not. These canals do not always come to us in the same condition, which is another reason why we do not always get to the end of the canals.

Dr. Sanger. I listened to an interesting talk by the same gentleman, some time ago, before the First District Society of New York, and having been convinced by him that I had fallen short of my duty as a dentist, I went home determined to enter every canal with a Donaldson cleanser, and I failed. I have tried very honestly and thoroughly to enter some canals to the apex, without being able to do it. And I say without blushing that I was unable to do it. I do not believe any living man would be able to do it, and know when he was at the end of the root without going through and doing damage. We might take a drill and make a hole, and then, when the instrument passed through to the sensitive tissue, declare we had reached the apex. I believe pulp-canals exist that you cannot get through, and I believe that when canals are so constructed that it is impossible to enter them, you may feel safe, after having thoroughly dried out the roots with hot air and sealed them up, without any filling at all at the apex. You can send your patient away, and be assured that that canal is as good as the best-filled canal in your practice.

Dr. Shields. Dr. Luckey spoke of Dr. Atkinson filling roots without a rubber-dam indicator ; that would be like a ship at sea without a rudder. I could not fill a tooth to the apex to save my life without a rubber-dam indicator. If the root measures a certain distance, I can only go into it that distance if I obey the indicator. A small piece of gold occupies a small space, and when the indicator indicates a large space, a small piece of gold having been introduced, it would mean that there was a space above the gold that was not reached. In that case I take a Donaldson nerve-cleanser, and remove the piece of gold and begin anew. Without the rubber-dam indicator I could never fill a root-canal. That is where Dr. Atkinson made a great mistake.

The doctor who spoke of curved roots made a very fine point. I

alluded to that, and meant to have explained it further, but forgot it. The way to determine the curve of a root is this : If you take a No. 5 fine Donaldson nerve-canal cleanser and pass it up a buccal root, and it simply goes half an inch, you may know it has not reached the apex ; we know there are few buccal roots that are not more than half an inch long. Then you are confronted directly with a crooked root. If the instrument does not go three-quarters of an inch before meeting an obstruction, and if after a gently vigorous turn it does not go farther, you know that you have a curved root ; you could not turn the instrument very much before it would catch in the curve, and you would know there was something wrong. But what is the direction of that curve ? The root is liable to turn in any direction ; some branch out, others come together. How do you know which way it turns ? Insert a No. 5 instrument, and it catches a little bit at a slight turn. The instrument being round, you can turn it without danger of breaking it off. When you turn it, hold the instrument between your thumb and forefinger very tightly, and remove it. When the point is visible, you will find a slight turn in the end of the instrument, and that turn will be exactly in the direction of the curve of the root, if you have held the instrument firmly. Then put the instrument into the root, and use an upward and downward motion, and the instrument enters into the curve ; press it gently in the direction of the curve, and you will find the instrument going farther and farther up. That curve is determined most positively by the instrument catching when you first begin to turn it. When you find it catching, turn it gently, and, holding the instrument firmly, remove it, and you will see the direction of the curve. Putting it back into the root in the same position, and moving it gently up and down, it will go farther and farther.

In regard to the instrument breaking off. One gentleman said he could use one of these Donaldson instruments for years, or for a long time, and it would look as though it would never break, and then the first thing you break one. I never use a Donaldson instrument twice ; I always use a new instrument for each case. Use new instruments, and you will not break them off in the root.

Some gentlemen in this room admit that they cannot fill all of these roots. I have carefully explained a method by which you can do it. Obey the instructions I have given you, and you can enter these curved roots. Dr. W. H. Trueman states that some of his patients cannot sit in the chair more than fifteen minutes, and he has to adapt his treatment to a fifteen-minute sitting. I am not telling you of a method of treating people who are about to die ; I am talking about treating the teeth of patients who can bear an ordinary sitting. It does not take an hour and a half to enter every buccal root. As a rule it takes about two seconds,—just the time that it takes to pass my hand three-quarters of an inch. An operation of that length is not, to my mind, a very inhuman one. One case in a hundred takes an hour and a half.

The same gentleman told us that for a great many years he used cotton as a root-filling material. I have spoken about cotton filling, and I do not wish to speak further about it. I do not approve of cotton filling ; I approve of permanent root-filling, and must differ with the gentleman.

Dr. Barlow wanted to know how we could pack gold hard with these Donaldson instruments. The gold used in filling a buccal root is in pieces about the size of a pin-head, or half the size of a pin-head, soft gold, and if he imagines that it takes very great pressure to pack a piece of gold half the size of a pin-head, he is mistaken. In filling with a Donaldson instrument, you can pack the gold solidly, because you use soft gold in small pieces.

Dr. James Truman said the important thing was to fill the root perfectly. That is the object, and if you can fill the root perfectly with chloro-percha, very well; but don't say you cannot fill a root at all because then it is not done perfectly. Instead of being an inhuman practice, the method I have described is a great kindness to the patient. An abscessed tooth is a much more severe tax upon the nervous system of the patient than the filling of a root-canal. I do not always complete an operation in one day; some nervous patients cannot sit more than an hour, and in that case I would stop, and they will come in fresh the next time; but if it takes six months I never fail to accomplish the object, I never fail to fill the root.

Dr. Richards inquired how I would get the point of an instrument out of a root in case it should break off. I have to answer the doctor by saying that if he uses new instruments he will never break them off. There is no excuse for breaking off instruments in the root. If you use them the second time, you are to blame, not the instrument.

Dr. Ottolengui speaks of root-canals being filled up with new bone. He is right. You find smaller canals in advanced age, but you can fill them if you take time. I am not speaking of children nine or ten years of age,—they are too young for this operation,—but grown people. I do not mean to say I can fill a root where there is no canal; not at all. Sometimes, from the throwing out of bony material by the odontoblasts, the whole pulp becomes ossified. I am not speaking of cases where there are centers of ossification half an inch long. If a tooth is blocked across half its way in the middle with tooth-structure, we cannot get through to the apex. I have taken out centers of ossification half an inch from the end, but I have not found one blocking the canal two-thirds of the way. To find a canal that is blocked across through bony material being thrown out is a very great exception; and I would not advise you to plug all roots with cotton because once in a lifetime you come across a root of that kind. If you do meet with a case like that, do the best you can; but the chances are that you will never see it. I have never seen one in thousands of cases.

Dr. Sanger tells us that he went home under the influence of an essay on root-filling, thoroughly expecting to fill every canal. Whatever good we accomplish is done by hard work. Take a tooth and fill buccal roots with these Donaldson instruments, work hard in your laboratory, and find out how to deal with curved roots. It cannot be accomplished in one night; it can be accomplished by hard work.

Subject passed.

(To be continued.)

DENTAL ALUMNI ASSOCIATION, UNIVERSITY OF MICHIGAN.

A CALLED meeting of the alumni of the Dental Department of the University of Michigan was held at Hotel Brunswick, Chicago, Aug. 17, 1893, in the parlors of the Delta Sigma Delta Fraternity.

M. F. Finley, of Washington, D. C., class of '78, was elected president, and U. D. Billmeyer, of Chattanooga, Tenn., class of '80, was elected secretary.

The following members registered: V. H. Jackson, Marie Thompson Bacon, D. M. Cattell, I. N. Seymour, T. J. Mason, R. M. Payne, T. W. Beckwith, H. F. Harvey, E. D. Brower, M. A. Mason, Geo. H. Wilson, L. L. Barber, Chas. A. Eckert, I. P. Bethel, Wm. Cleland, Helen L. Searle, Vida A. Latham, May Weston, J. W. Wassall, E. Phillips, Geo. J. Dennis, Chas. F. Noyes, P. J. Kester, John A. Watling, U. D. Billmeyer, J. W. Youngman, C. E. Meerhoff, G. H. Copp, J. C. St. John, Wms. Donnally, W. H. Whitslar, J. Taft, L. L. Davis, M. F. Finley, W. Mitchell, May Cleo Smith, Thomas C. Leiter, Ida Gray.

Very interesting addresses were made by Drs. V. H. Jackson, J. A. Watling, J. Taft, M. F. Finley, Marie T. Bacon, P. J. Kester, and others. After a general handshaking and exchange of greetings, the meeting adjourned to meet at Old Point Comfort next year, at the time of the meeting of the American Dental Association.

U. D. BILLMEYER, *Secretary*.

CALIFORNIA STATE DENTAL ASSOCIATION.

THE twenty-fourth annual meeting of the California State Dental Association was held at the College of Dentistry, San Francisco, June 13 to 16, 1893, inclusive.

The following officers were elected for the ensuing year: L. A. Teague, San Francisco, president; I. W. Hays, Jr., Grass Valley, first vice-president; C. L. Goddard, San Francisco, second vice-president; W. F. Lewis, Oakland, third vice-president; W. Z. King, San Francisco, recording secretary; C. E. Post, San Francisco, corresponding secretary; T. N. Iglehart, San Francisco, treasurer.

CHARLES E. POST, D.D.S., *Cor. Secretary*,

14 Grant avenue, San Francisco, Cal.

MISSOURI STATE DENTAL ASSOCIATION.

THE twenty-ninth annual meeting of the Missouri State Dental Association was held at Excelsior Springs, Mo., July 11, 12, 13, 14, 1893. The following officers were elected for the ensuing year: Dr. W. E. Tucker, president; Dr. J. T. Fry, first vice president; Dr. Charles L. Hungerford, second vice-president; Dr. Wm. Conrad, corresponding secretary; Dr. S. C. A. Rubey, recording secretary; Dr. Jas. A. Price, treasurer; Dr. Frank Slater, Dr. W. H. Morrison, Dr. C. L. Hungerford, committee on ethics; Dr. E. E. Shattuck, Dr. H. A. Cress, Dr. E. B. Crane, board of censors; Dr. James A.

Price, committee on law ; Dr. John G. Harper, committee on new appliances.

The next meeting of this association will be held at Excelsior Springs, Mo., on the first Tuesday after July 4, 1894.

WM. CONRAD, *Cor. Secretary*,
St. Louis, Mo.

DENTAL SOCIETY ANNOUNCEMENTS.

UNION MEETING IN NEW YORK.

THE union meeting for 1893 of the Sixth, Seventh, and Eighth District Societies of New York will be held at Rochester, Tuesday, Wednesday, and Thursday, October 31, and November 1 and 2. The Chamber of Commerce rooms have been secured for the meetings, also several by-rooms for the use of exhibitors. In addition to members of the above societies, invitations have been issued to those of other districts, the officers of the state society, and prominent members of the profession of the Dominion. A number of papers on live topics, by men fully competent to handle them, are promised, and more expected. The program now in preparation will follow the general announcement as soon as its numerous details have been perfected. Communications in regard to professional and business affairs of this gathering should be addressed to Dr. Charles H. Howell, Rochester, N. Y.

EDITORIAL.

THE STATUS OF THE DENTAL PRACTITIONER.

In this and recent issues of the DENTAL COSMOS we have presented to our readers the reports of several important meetings of dental practitioners, in which questions affecting the status of dentistry, its relations to medicine, and the educational requirements of the dentist, have been more or less discussed with the usual accompaniment of ill-considered statement, which does not appear to have lessened the confusion which seems to be an inseparable condition of these subjects. For example, by the chairman of the section on Oral and Dental Surgery of the Pan-American Medical Congress, it is asserted that "dentistry is on a thoroughly founded footing as a profession, fully self-sufficient in many respects, though not differing from other sciences in that it depends largely upon several others for its existence. After mechanics, dentistry depends upon nothing else so largely as upon medicine and its specialties." In the ensuing discussion, the following statements occur : "It is becoming more and more generally held that dentistry is a branch of the great healing art." . . . "The feeling is expressed more frequently than ever before that dentistry is a specialty of medicine, but still there are many,

including even some of our teachers, who hold that it is a mere mechanical art, or if not this, that it is a profession apart from that of medicine." . . . "It seems proper that we have assumed that dentistry is a specialty of medicine, but nevertheless we stand as dentists, and take pride in the advance the profession of dentistry has made." These statements as quoted are taken at random from the report, and are introduced as fair examples of similar remarks that are made wherever the status of dentistry is the topic for discussion. They not only manifest a most diverse variety of sentiment with respect to the problem, but they are severally imperfect as attempts at its solution. The question is intrinsically an educational one, and the conflicting statements regarding the professional status of the dental practitioner are in each case the expression of the author's individual concept of dentistry from his own point of view. While many shades of opinion find expression with respect to the essential nature of dentistry, they may be generally traced to and included under two fundamental conceptions,—viz, that dentistry is a scientific calling, or that it is a mechanical art.

Growing out of these two conceptions, we have the statements, frequently expressed, that "dentistry is a specialty of medicine," "dentistry is a distinct and independent profession," "dentistry is a mechanic art," "dentistry is a mere handicraft," "dentistry is empirical," dentistry is or is not scientific, etc. Each of these statements no doubt contains a modicum of truth, but none of them is wholly true.

If by medicine is meant the healing art, and specialty means a special department, then dentistry is a specialty of medicine. If by the axiom, "dentistry is a specialty of medicine," is meant that it is *de facto* a specialty having coequal status with the other recognized specialties of medicine, the statement is untrue, for the simple reason that the medical curriculum does not include the special training of the dentist, nor does the dental degree confer the right to practice medicine. As to the axiom, "dentistry is a distinct and independent profession," we may ask, Independent of what? The statement is an absurdity on its face. No department of the healing art is so palpably dependent on all its other departments as is dentistry. The very complexity of its educational demands is the result of its dependence upon the large number of sources of knowledge which are tributary to it, and it glories in this very dependence. As to the question whether dentistry is a scientific calling or a mechanic art, either statement is deficient as a definition, and the use of either in this connection probably grows out of a misunderstanding of the terms employed, as well as a misconception of the facts.

There is a science and there is an art of dentistry, and the latter

should be the material expression of the former. A science is a system of classified knowledge; an art is, in general, the material expression or utilitarian application of the science, though an art may have but an empirical basis. Thus, the invention of the Leblanc soda process, which gave to the world cheap glass and cheap soap, was a scientific discovery based upon a knowledge of chemical principles; and yet the art of making soda might be conducted in the most empirical manner by a workman instructed in its details, even though he were devoid of knowledge as to the scientific principles involved. Or it is quite possible for a laboratory workman to solder a gold plate without any scientific knowledge of the constituents and physical properties of the alloys he uses; but in his case so much of dentistry as he has acquired is a mechanic art. He might add indefinitely to the details of his empirical knowledge until he were able to practice within a limited field, but his practice would be that of the mechanic even in his operative procedures, and his treatment and operations be empirical. The science of dentistry is developed by the application of the scientific method in observations upon the cause and effect of phenomena related to the oral cavity and its treatment. It concerns itself with the why of these phenomena, whereas the attitude of the art is related to the question, How are they to be adapted to utilitarian ends? One is the explanation of the cause, the other the means to the end, and these two conditions are interdependent and inseparable. Human experience in other departments of knowledge has shown that the greatest progress has resulted from an understanding and correct application of the principles which are behind phenomena,—*i.e.*, the most rapid development takes place from the scientific standpoint and by the application of the scientific method.

This idea as applied to progress in dentistry is already recognized, and is the leaven which is at the basis of the present activity observable throughout the dental profession of the world with respect to the questions of dental education and dental professional status. The importance of these questions cannot be overestimated. There has been frequently expressed by those in the dental ranks whose opinions cannot be lightly brushed aside, the belief that greater breadth and thoroughness in the educational curriculum of the dentist are demanded. The confused state of opinion upon this subject, especially as related to the dental educational conditions in the United States, while at present greatly improved upon former ones, is a matter which requires careful examination and better adjustment. Our transatlantic brethren have taken a decided stand not only with respect to their own dental curriculum, but have officially expressed their opinion as to the inferiority of our own. While this

in no sense settles the question, it should lead us to calmly examine our educational systems from an unprejudiced, unselfish standpoint, and determine to what extent these criticisms are justified by the facts.

The status of dentistry must be determined by the character of our educational system ; our relationship to medicine should be defined after it has been determined what is the best plan for the education of the student so as to best fit him for the practice of dentistry. Heretofore our educational schemes have been based upon misinterpretations of the proposition, or its negative, that we are medical specialists. This has simply produced confusion. The central animating idea of the dental curriculum should be that its function is to make the best dentist, first, last, and all the time. When this has been accomplished, it will be full time to assert his position in relation to the practitioner of medicine, as this question will then have defined itself.

The subject here noted should be fully discussed from all sides, and the DENTAL COSMOS will gladly welcome to its pages the thought of any or all who can throw more light upon it.

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CODE DU CHIRURGIEN-DENTISTE. Explication de la loi du 30 Novembre 1892, sur l'exercice de la médecine, en ci qui concerne exclusivement les Chirurgiens-Dentistes. Par EMILE ROGER, Avocat à la Cour de Paris, Professeur de droit Médical à l'École dentaire de Paris, et CHARLES GODON, Chirurgien-Dentiste, Ex-Directeur adjoint de l'École dentaire de Paris, Officier d'Académie. Paris, J. B. Baillière et Fils, Libraires, 19 Rue Hautefeuille. 1893.

MM. Roger and Godon have rendered an important service to the dental profession, especially of France, in the consummation of their work as presented in this volume. In it they present the results of their exhaustive study of the legal status of the dental profession of France, and the various attempts at legislative enactments for its protection and improvement ; it is, in fact, a careful *résumé* of all the efforts at dental legislation previous to the law of 1892, now in force. These are discussed and explained in their relation to the development of professional status in France. The work includes also a study of the character and effects of dental legislation in other countries in comparison with that of France. The authors clearly show the beneficent results of proper legislation as a factor in improving the status of dental

practitioners in their own country, and are convinced of its pronounced value in this regard. The book is of value not only as a contribution to the literature of dental jurisprudence, but in a historical way as related to dental professional development.

OBITUARY.

DR. W. C. WARDLAW.

DIED, suddenly, at Atlanta, Ga., September 3, 1893, WILLIAM CLARKE WARDLAW, M.D., D.D.S., in the fifty-sixth year of his age.

Dr. Wardlaw was born in Abbeville, South Carolina, September 3, 1837. Thus it will be noticed that he passed away on the recurrence of his birthday. He had a severe attack of illness in February last, when his life was almost despaired of, but in a large measure he recovered from that attack, though he had not been an entirely well man since.

Dr. Wardlaw was educated and graduated A.B. at the South Carolina College in 1857, and M.D. at the Charleston Medical College in 1861. He studied dentistry at the Pennsylvania College of Dental Surgery, and was a graduate of that institution with the class of 1866. He also received the degree of D.D.S. (post-graduate) from the New York College of Dentistry in 1886. He had for many years been a member of the Georgia State Board of Dental Examiners; was long a member of the Georgia State Dental Society, of which he was president in 1879; and was a member and at one time president of the Southern Dental Association. He took an abiding interest in all professional educational matters, and was an attendant at the late World's Columbian Dental Congress at Chicago.

One who knew Dr. Wardlaw long and well thus writes of him: "He was always an ethical, scholarly, studious, and observant practitioner; quiet and amiable, modest and unobtrusive; most careful and considerate of others, measuring up to the standard of the golden rule as nearly as any man known to the writer. He had resided and practiced at Augusta, Ga., for many years, and was an active man in church and state affairs. Perhaps no man in the South was better known in the North than Dr. Wardlaw. He had lately been elected dean of the Atlanta Dental College, without his knowledge and while he was ill, and on his recovery had arranged to move to Atlanta with his family, and on the day before his death had reached his new home, where he suddenly lost consciousness and passed away, with a broader field and bright prospects before him."

Dr. Wardlaw was twice married,—first, in 1862, to Mary J. Thompson, of Kershaw county, S. C., who died in 1886; and secondly, in 1889, to Harriet C. Adams, of Boston, Mass., who survives him. He had eight children, six by his first wife and two by his second.

His funeral took place at the Presbyterian church at Augusta, of which he was a member and elder. It was numerously attended by relatives and friends, and by members of fraternities to which he belonged.

His death is a severe loss to the dental profession, and especially to the institution which had enlisted his services.

DR. GEORGE HYDE.

DIED, at Truro, Nova Scotia, September 10, 1893, of paralysis, GEORGE HYDE, D.D.S., in the fifty-first year of his age.

Last spring Dr. Hyde met with the accident of being thrown from his carriage, and it resulted in paralysis of the sensory nerves, which finally caused his death on the date above stated.

Dr. Hyde was born in Halifax, N. S., on the 18th of June, 1843. After the usual early education, he spent a dental pupilage with Dr. Heckman, and soon afterward entered practice. Subsequently he matriculated at the Philadelphia Dental College, and graduated with the class of 1876. He was a most active member of the Nova Scotia Dental Society, having been one of three of its chief organizers, and appointed on its council.

Dr. Hyde was a man of commanding presence, being considerably above the ordinary physical stature. He was married September 3, 1868, to Miss Ingraham, of North Sydney, who survives him, with five children,—four daughters and one son.

DR. HENRY FISHER.

THE following resolutions were passed by the St. Louis Dental Society :

WHEREAS, In the sudden death of Dr. Henry Fisher the St. Louis Dental Society has lost one of its oldest and best members, a faithful and trustworthy officer of many years, and one who had the highest interest of the society and profession at heart ; be it

Resolved, That our heartfelt sympathy be tendered to the bereaved family ; and

Resolved, That a copy of this preamble and resolutions be sent to the family of the deceased, and also to the daily press and leading dental journals for publication.

W. H. EAMES,	} <i>Committee.</i>
WM. N. MORRISON,	
J. B. NEWBY,	

DR. HARVEY W. GRAHAM.

DIED, at Strongstown, Pa., July 24, 1893, DR. HARVEY W. GRAHAM.

Dr. Graham had been in bad health for several years. He was a very promising young man, and was a half-brother of Dr. Wm. E. Hanna, who for a time was located in Johnstown, Pa., but is now settled at Leadville, Col.

DR. A. P. PRETERRE.

AMONG recent deaths in the dental profession in France is recorded that of Dr. APOLLONI PIERRE PRÉTERRE, lauréat of the Faculté de Médecine, Paris, in the seventy-third year of his age.

Dr. Préterre attained considerable prominence by his successful artificial restorations of the face and palate, and also by the exhibit of remarkable artistic collections in his specialty at the Universal Expositions of 1867, 1878, and 1889, when he was awarded highest premiums for his presentations and skill. His dental cabinet was for a long time regarded as a focus of clinical

education. He was the founder of the first dental journal (*L'Art Dentaire*) in France, and in 1880 he interested himself in the establishment of *L'École Dentaire de Paris*, and was one of the original contributors to that enterprise. He was also a member of the *Société d'Odontologie*, and was assiduous in his efforts for its success.

DENTAL LEGISLATION.

DENTAL LAW OF ARIZONA.

AN ACT to Regulate the Practice of Dentistry in Arizona.

Be it enacted by the Legislative Assembly of the Territory of Arizona:

SECTION 1. That it shall be unlawful for any person, who is not at the time of the passage of this act, engaged in the practice of dentistry in this Territory, to commence such practice unless such person shall have received a license from the Board of Examiners, as hereinafter provided for.

SEC. 2. The governor of the Territory shall appoint, after the passage of this act, five (5) skilled dentists of good repute, residing and doing business in the Territory, who shall constitute a Board of Registration in Dentistry.

But no person shall be eligible to serve on said board unless they have been regularly graduated from some reputable dental college, duly authorized to grant degrees in dentistry, or who shall have been actively engaged in the practice of dentistry for a period of ten (10) years previous to appointment.

SEC. 3. The length of term for which the members of said board shall hold office shall be three (3) years, except that two of the members of the board, first to be appointed under this act, shall hold office for the term of one (1) year, two for the term of two (2) years, and one for the term of three (3) years respectively, and until their successors shall be duly appointed and qualified.

In case of a vacancy occurring in said board, such vacancy shall be filled by the governor in conformity with Section 2.

SEC. 4. Said board shall choose one of its members president and one secretary and treasurer, and it shall meet at least once a year, and oftener if it shall be deemed necessary.

Four of said board shall constitute a quorum.

The proceedings of said board shall at all reasonable times be open to public inspection.

SEC. 5. It shall be the duty of each person now engaged in the practice of dentistry in this Territory, within ninety (90) days after the passage of this act, to send an affidavit to the secretary of said board, setting forth his or her name, place of business, post-office address, the length of time they have been engaged in the practice of dentistry in this Territory: if a graduate of a dental college, state the name of college, and shall pay to the treasurer of said board the sum of five (5) dollars, for which they shall receive from said board a practitioner's certificate.

On failure to comply with the provisions of this section they shall be required to appear before the board, and be examined by said board.

SEC. 6. It shall be the duty of all persons not holding diplomas, who wish to engage in the practice of dentistry in this Territory, after the passage of this act, to appear before said board at a regular meeting and pay into the treasury of said board the fee of twenty-five dollars (\$25), not returnable, and stand an examination by said board in operative and prosthetic dentistry, and all the branches taught in a reputable dental college, and if such applicants pass an examination satisfactory to said board, said board shall issue to said applicant a license which will entitle him or her to practice dentistry in this Territory.

SEC. 7. It shall be the duty of all persons holding diplomas, who wish to engage in the practice of dentistry, after the passage of this act, to present or send to the secretary at the regular meeting of said board, an affidavit and diploma with fee (\$5), not returnable, and after said board being satisfied that said diploma belongs to said applicant, and that it was issued in good faith by

a reputable dental college, said board shall issue to said applicant a certificate of registration for said diploma.

SEC. 8. All persons receiving a certificate to practice under this act shall register his or her certificate with the county recorder of the county in which he or she resides, and shall pay to the county recorder for such registration the sum of two dollars (\$2).

Any failure on the part of any person holding such certificate to comply with the first part of this section within thirty (30) days after receiving certificate, shall forfeit said certificate, and any certificate once forfeited shall not be returned by said board until applicant shall have paid to said board the fine of twenty-five dollars (\$25).

It shall be the duty of each county recorder to forward to the secretary of said board, the names of all persons having registered their certificates with them.

SEC. 9. It shall be the duty of said board to cause to be kept a record of all its proceedings, and the names and addresses of all persons qualifying under this act.

An annual report of the same shall be rendered to the governor.

All moneys received by the secretary under this act shall be used for the legitimate expenses of said board, but in no case shall any money of the Territory be used for that purpose.

SEC. 10. Any person or persons violating any provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction shall be fined not less than one hundred dollars (\$100) nor more than two hundred dollars (\$200), or confined six months in the county jail, or both, for each and every offense.

All fines recovered under this act shall be paid into the common-school fund of the county in which such conviction takes place.

SEC. 11. It shall be the duty of the prosecuting attorney of each county to prosecute such cases when brought to his knowledge.

SEC. 12. That nothing in this act shall be construed so as to interfere with the rights and privileges of resident physicians and surgeons in the discharge of their professional duties.

SEC. 13. This act shall take effect immediately after its passage.

Approved April 3, 1893.

PERISCOPE.

THE FORMS OF EDENTULOUS JAWS IN THE HUMAN SUBJECT.—Dr. Harrison Allen demonstrated the peculiarities of the edentulous upper and lower jaws of the human subject. He held that the statement made that the jaws exhibit the result of uniform absorption of the alveolar processes was not true. The bone-tissue which held the teeth in place being a complementary structure, is indeed rapidly absorbed after the teeth are lost. But when the alveolar processes have disappeared, a secondary process of adaptive hyperostosis takes place. These statements relate in the main to the upper jaw, but the conclusions can be applied also to the lower jaw.

This adaptive process occurs in three regions, namely, that for the incisor teeth, that for the cuspid and the first bicuspid, and that for the second bicuspid and the molar teeth. These regions answer roughly to those occupied by various kinds of teeth, and differ in much the same way as the incisiform, caniniform, and molariform teeth differ from one another. The region of the incisors is compressed and beaked, that of the cuspid and the first bicuspid is coarsely conical or tubercular, while that of the second bicuspid and molars is either broad and massive, or compressed. It is rare to find an edentulous dental arch uniformly hyperostosed or uniformly atrophied, but one or more of the regions above named assume the form described, or at least exhibit indications of changes different in character from the mere loss of the alveolar processes.

The lower jaw passes up in front of the upper jaw in aged individuals who have lost teeth. As a result, the attrition of the incisorial region of the lower jaw is secured against the *front* of the upper jaw. The result attained by

such attrition Dr. Allen called "shearing." Shearing takes place in proportion as the upper jaw at its anterior arc is beaked. It is interesting to find that when "shearing" is present the articular surface of the condyloid process is invariably at the anterior part.

The loss of the alveolar process in the incisorial region of the upper jaw causes the incisive foramen to assume an absolutely new position in relation to the line of mastication. It exhibits a disposition to lie *in* the dental arch instead of back of it. The attrition by "shearing," however, protects the contents of the foramen from pressure.

The region in the upper alveolar arch directly back of the last molar is apt to become symmetrically hyperostosed. These masses appear to be dominated by the pyramidal process of the palatal bones and the pterygoid process of the sphenoid bone. At least they are not used for mastication.

The subdivision of the teeth into kinds, which answer to the incisors, cuspids, bicuspid, and molars, correlates to the strongest suture lines in the face; that is to say, the incisors correspond to the premaxillo-vomerine junction, the cuspid and first bicuspid to the fronto-maxillary junction, and the remaining teeth to the fronto-malar junction.

The edentulous skulls examined were 14 in number, distributed as follows: Ancient Egyptian, 3; Arabian, 2; Hindu, 2; Peruvian, 2; Negro, 1; N. A. Indian, 2; Anglo-American, 2. Of this number, the Anglo-Americans alone could by any possibility represent the teeth of persons who could have worn artificial teeth, and in this way modify the act of mastication in the aged. Since one of the Anglo-American crania was that of an idiot, the probability is reduced to a minimum that an artificial denture had been used during life in any of the specimens examined.

{ Entire arch hyperostosed, 3.	
{ Entire arch absorbed, 4.	
{ Left side arch hyperostosed, 1.	
{ Right side arch hyperostosed, 0.	
{ Left side arch absorbed, 2.	
{ Right side arch absorbed, 4.	
{ Region of incisors hyperostosed ("beaked"), 6.	
{ Region of incisors "sheared," 5.	
{ Region of cuspid and first bicuspid hyperostosed	{ Right and Left, 2.
	{ Left, 1.
{ Region of cuspid and first bicuspid absorbed	{ Right, 1.
	{ Right and Left, 2.
{ Left, 0.	
{ Right, 0.	
Region of second bicuspid and molars hyperostosed	{ Right and Left, 2.
	{ Left, 1.
Region of second bicuspid and molars absorbed	{ Right, 1.
	{ Left, 0.
Region of second bicuspid and molars "beaked"	{ Right and Left, 2.
	{ Left, 0.
{ Right, 0.	

Symmetrical hyperostoses in alveolar arch in front of pterygoid process, 8.
Incisive foramen in line of dental arch, 8.

It is noteworthy that from the entire series only four showed complete absence of any secondary bone adaptation consequent upon the loss of alveolar processes, and that all of these were from civilized races, two Ancient Egyptian and two Anglo-American. The want of harmony between the secondary adaptations probably correlates with the irregular rate at which the teeth are lost. Individual peculiarities in this regard are doubtless numerous.

Dr. Allen assumed that the coarse food of savage and semi-savage people caused the jaws even in an edentulous condition to be used actively in the act

of mastication, while the more carefully prepared food suitable to the aged of civilized people enabled the jaws to have comparative rest, and hence the mechanical conditions which predetermined the localization of new structures were not active. The speaker concluded that the series of observations strengthens the position taken, that the same forces which differentiate the kinds of teeth operate in fashioning the shape of the jaws, even after the loss of the teeth.

Dr. C. N. Peirce remarked that the four superior arches, which Dr. Allen has presented as being representatives of civilized races, could not be accepted as indicating a uniform condition of edentulous jaws at the present time. The crania collected from civilized communities in the future will, in their edentulous jaws, certainly show less irregularity in the individual alveolar ridges than was present in the several specimens exhibited by Dr. Allen, and in the absence or presence of a ridge would not display the uniformity seen in the four exhibited. In the future, the greatest variations will certainly be exhibited. In some a prominence will be present, which in life amounted to almost a monstrosity, while in others there will be found a complete atrophy or absorption of the entire ridge in both the superior and inferior maxilla. The symmetry of the ridge will in a measure be due to the uniformity of pressure from an artificial denture, and an absence of the forces alluded to by Dr. Allen, which doubtless had had in some cases an influence in the secondary development of bony structure, while those parts were forced to perform the function of the teeth which had been prematurely lost, though some of the prominences to which attention had been drawn were, in the estimation of Dr. Peirce, due to the difference in the time of the loss of the teeth. Why some maxillaries should show such complete atrophy, while others had secondary development, Dr. Peirce could not explain, but he believed it was associated with temperamental and nutritional conditions. The development certainly indicated a healthy recuperative power on the part of the individual.

With reference to the protrusion of the lower jaw and chin, and the change in adaptation of condyle to glenoid cavity, which Dr. Allen had so aptly illustrated, Dr. Peirce thought they could be explained upon the principle of use and disuse, with adaptation of structures. In infancy, the angle resulting from the relation of the ramus to the body of the bone was much greater than a right angle; indeed, the ramus was but little above the same horizontal plane occupied by the body of the bone, and the jaw was capable only of vertical and antero-posterior motion, such as is essential to sucking or nursing. As the three true or permanent molars are developed, the ramus assumes its vertical position, forming almost a right angle with the body of the bone, and at the same time making lateral or horizontal movement possible while establishing the concomitant relation between the condyles and glenoid cavities. As these permanent molars later in life are lost, the force upon the jaw in occlusion is confined to the anterior part or incisive locality, which would necessarily tend to increase the angle and protrude the chin. This occurs sometimes quite early in life and while all the anterior teeth are in position. At the same time that the vertical motion is exerting this influence the necessity for lateral motion has ceased, by the loss of the grinders; hence the change in the relative position of the condyle, which was so well shown by the previous speaker, and which has been necessitated by a return to the vertical and antero-posterior motion common to infancy, with the loss of the horizontal or lateral motion of maturity.—*Proceedings Acad. Nat. Sci. of Philadelphia.*

THE EDUCATIONAL COURSE OF THE UNIVERSITY OF PENNSYLVANIA (Department of Dentistry).—Dr. James Truman, D.D.S., Dean of the Department, forwarded, in reply to the Board's letter, a copy of its latest announcement. The examinations held by the Department of Dentistry were altogether oral; hence he regretted he was unable to supply copies of examination papers. Mr. George moved that the committee report whether the curriculum of the University of Pennsylvania (Department of Dentistry) was equal to the Victorian curriculum, with a view to its recognition. Dr. Carter seconded. Carried.—*Proceedings of the Dental Board of Victoria, in Australasian Jour. of Pharmacy.*

SACCHARIN AS A MOUTH ANTISEPTIC.—According to the *American Journal of Dental Science*, saccharin is a powerful antiseptic of the mouth in weak solutions, but in strong ones it attacks the enamel of the teeth. This property of attacking the enamel seems to be due to its acidity. Neutralized solutions of saccharin, even very concentrated, are absolutely inoffensive for the teeth, and also sufficiently antiseptic, especially against the microbes of the mouth. —*Notes on New Remedies*.

DENTISTS IN ENGLAND.—The total number of registered dentists in England is 4817, of which 25.43 per cent. are graduates of dental colleges,—a proportion steadily increasing.—*Med. News*.

WOMEN dentists have proved so popular in London that a scholarship has been founded for assisting women without means in the study of that profession.—*Australasian Jour. of Pharmacy*.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST, 1893.

- August 1.—No. 502,352, to ALONZO A. DILLEHAY. Dental plugger.
 " " No. 22,668, to JOHN KERR. Design for dental clasp.
 August 8.—No. 502,933, to ELIHU R. PETTIT. Dental bracket.
 August 15.—No. 503,258, to RUFUS G. STANBROUGH. Dental disk and carrier.
 " " No. 503,419, to ALBERT W. JOHNSTON. Preparing dental fillings.
 " " No. 503,420, to WILLIAM A. JOHNSTON and ARTHUR W. BROWNE. Clutch for electric motors.
 " " No. 503,453, to JOHN C. DAVIDSON. Regulator for electric motors.
 August 22.—No. 503,737, to ARTHUR W. BROWNE. Dental engine.
 " " No. 503,740, to CONSTANT DORIOT. Dental engine.
 " " No. 503,744, to W. STORER HOW. Dental drill.
 " " No. 503,750, to CHARLES H. RICHARDSON. Regulating apparatus for electric motors.
 " " No. 503,826, to ROBERT BREWSTER. Artificial-tooth mold.
 August 29.—No. 504,126, to CHARLES C. DURR. Artificial tooth.

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No. II.

ORIGINAL COMMUNICATIONS.

CONTRIBUTIONS TO THE HISTOGENY AND HISTOLOGY OF BONY AND DENTAL TISSUES.

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ALL progress in the study of animal tissues is effected by new methods, or by a suitable combination of old methods. The more complicated a micro-technic method is, the sooner it gives rise to artificial products, and the more thoroughly a worker must be trained in histology if he wants to avoid mistakes.

The dentist is chiefly interested in bony and dental tissues; but it is exactly these tissues which offer the greatest difficulties to microscopical examination, and require the most complicated treatment. Therefore we cannot be surprised that in spite of numerous—and in some cases rather poor—papers on dental histology, many points still remain obscure.

He who nowadays wishes to work with success in dental histology must be thoroughly familiar with all methods. *There is no absolute best method for histological investigations, and there never will be.* Every method has its advantages and its drawbacks. It is only by combining the various methods, and avoiding as far as possible the manifold sources of error, that we may hope to approach perfection.

Being engaged in writing my "*Lehrbuch der Zahnheilkunde*," I have been obliged during the past year to make a special study of dental histology, and I am now able to publish a few of my results. I should like to express beforehand my grateful thanks to my publisher, Herr Gustav Fischer, of Jena, for the artistic and beautiful wood-cuts executed by Herr Tegetmeyer, of Leipzig.

The tissues of the animal body arise by the differentiation of the three germinal layers,—*i.e.*, thin cellular membranes of epithelial character. Each of these three germinal layers is able to form epithelial tissues. But the supporting and connecting tissues of the

body are exclusively formed by the middle one of the germinal layers, the mesoblast. The view formerly held was that the mesoblast can form only these latter tissues, but no epithelium, and accordingly we find that even to-day the connective-tissue cells are somewhat incorrectly called mesodermal cells.

The epithelial tissues are characterized by polygonal, cubical, or columnar cells, which lie close together. Blood and lymphatic vessels are never found in this tissue. The connective tissues, on the contrary, are rich in blood-vessels, and their cells have never lost their mutual connection. They do not usually touch each other, but are connected by a protoplasmic intercellular matrix. Now we know that a body which is able to develop freely in all directions assumes a spherical shape, and thus we see that the usually cubical cells of the mesoblast assume a spherical shape as soon as they are changed into embryonic connective tissue. Accordingly these cells are suitably called "mesodermal spherical cells." All supporting tissues of the body—muscles, bone, dentine, connective tissue—are formed from such embryonic spherical cells. *It is quite impossible for true epithelial tissue to be formed from such cells.*

The teeth of vertebrates develop, as do the papillæ of the skin, from two tissues,—viz, epithelium and connective tissue. Papillæ of the skin, hairs, horny and dentine teeth are, in their first origin, homologous structures, and are formed by epithelial cells of the epiblast growing round a papilla of mesoblastic spherical cells. *In all those structures it is the epithelium on which the shape depends, and not the connective tissue.* The expression, "invagination of the dental papilla," which has been used hitherto, is therefore not quite correct. The connective-tissue papillæ are not formed by an active growing into a mass of epithelial cells, but rather by the epithelium pushing itself downward in the shape of a bell and growing, and, so to speak, flowing around the connective-tissue papilla.

Whilst the papillæ of the skin remain definitely at this stage, the hairs and horny teeth are differentiated by a formation of bony substance from the epithelium, and the dentine teeth by enamel being deposited from the epithelium and dentine from the connective tissue. *The history of evolution shows, without any doubt, that the dentine teeth and the homologous placoid scales of the Selachii arose among the ancestral vertebrates from simple papillæ of the skin.*

In Figs. 1 and 2 are shown two developing teeth of man in the papillary stage. The epithelium of the so-called enamel-organ is seen to be connected with the epithelium of the buccal cavity by means of the dental ridge. The outermost layer of the enamel-organ is formed of high columnar cells of a similar character to those of the undermost layer of the rete mucosum of Malpighi. The epithelial cells of the central mass are polygonal, partly squamous. As there are no blood-vessels in the epithelium, and nutrition takes place exclusively by osmosis, there must be special arrangements for carrying nutritive material to the large masses of actively growing epithelial cells. Among the lower vertebrates, where the teeth are small, grow rapidly, and are soon worn away, the enamel-organ consists only of a few layers of epithelial cells; but among the higher vertebrates, the teeth of which are developed more slowly, the enamel-organ is not only the matrix of the enamel-tissue, but it also has the

function of providing space for the developing hard structures, and also of hindering any absorption by a too close proximity to the blood vascular system. This task is fulfilled by the formation of the so-

FIG. 1.

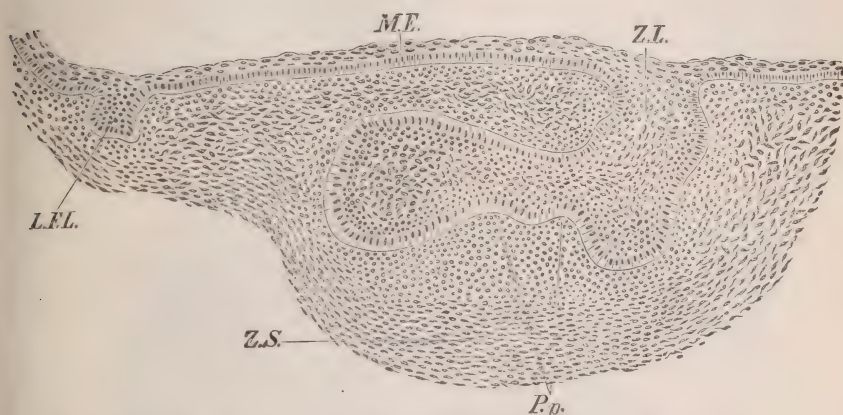


FIG. 1.—Human fetus (3 cm. long). Sagittal section through the first lower milk molar with two papillæ. *P.p.* *Z.S.*, dental sac; *Z.L.*, dental ridge; *M.E.*, epithelium of buccal cavity; *L.F.L.*, ridge of labial furrow. 100 diam. Drawn from a microphoto.

called enamel-pulp. This curiously modified epithelial tissue was, on account of its star-like cells, formerly regarded as connective tissue, till Kölliker, among others, pointed out its real nature. The forma-

FIG. 2.



FIG. 2.—Human fetus (4 cm. long). Sagittal section through the cuspid with two papillæ, *P.p.* *Z.S.*, dental sac; *M.E.*, epithelium of the jaw; *Z.L.*, dental ridge; *L.F.*, labial furrow; *L.F.L.*, ridge of the labial furrow; *L.*, lip. 100 diam. Drawn from a microphoto.

tion of the star-like epithelial cells always takes place first in the center of the enamel-organ. The polyhedral cells of the rete mucosum of Malpighi, which lie closely packed under the enamel-epithe-

lium, increase here in size. The nuclei become somewhat larger, and move apart from one another as the cell-bodies grow larger (Fig. 3, *S.P.*). Between these cells a clear protoplasmic fluid is secreted, causing the appearance of small intercellular spaces. These spaces increase, and press apart the neighboring cells to such an extent that the cells are finally connected with one another only by means of narrow protoplasmic bridges (Fig. 4, *S.P.*). Thus these transformed epithelial cells appear star-like, and between them we find a wide-meshed canal system, containing a thin fluid protoplasm, apparently highly

FIG. 3.

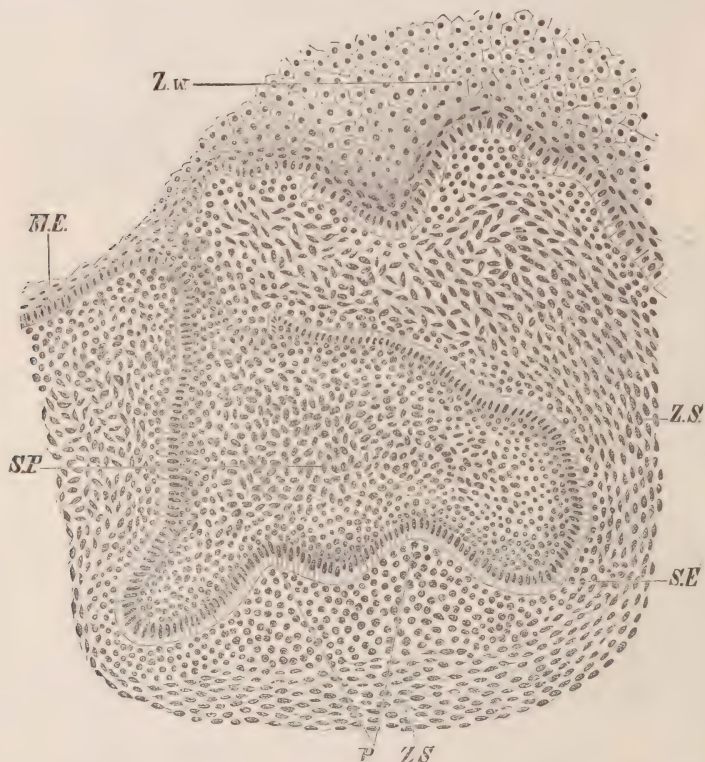


FIG. 3.—Cow's fetus (4¾ cm. long). First milk molar. *P*, double papilla of the dentine germ; *Z.S.*, dental sac; *Z.w.*, so-called dental wall, characteristic of Ruminantia; *M.E.*, unmodified epithelium of the jaw; *S.E.*, enamel epithelium; *S.P.*, enamel-pulp. 200 diam.

suitable for a rapid circulation of nutritive fluids. The enamel-pulp has reached the height of its development at the time when the first deposition of dentine and enamel takes place (Fig. 5). It degenerates when the deposition of the enamel increases, and reaches, in the direction of the root, only down to the future neck of the tooth, —*i.e.*, to the place where the deposition of the enamel ends. Hertwig's epithelial sheath, which goes on growing as matrix for the developing root, consists only of fused external and internal enamel-epithelium, and it never contains star-like cells of the enamel-pulp. Therefrom it

becomes evident that the development of the enamel-pulp among the higher vertebrates is intimately connected with the deposition of a thick enamel-cap. Fig. 6 shows plainly that the enamel-pulp, now degenerating, reaches only down to the lower limit where the enamel is deposited.

Regarding the formation of the enamel, I have arrived at the same results as V. v. Ebner. If the series of sections is sufficiently thin (5-10 micros.), all the details can be made out in the teeth of small mammals, highest powers being employed. The most suitable preparations are those which have been made with Mährenthal's method (pyroligneous acid). The developing enamel is then stained

FIG. 4.

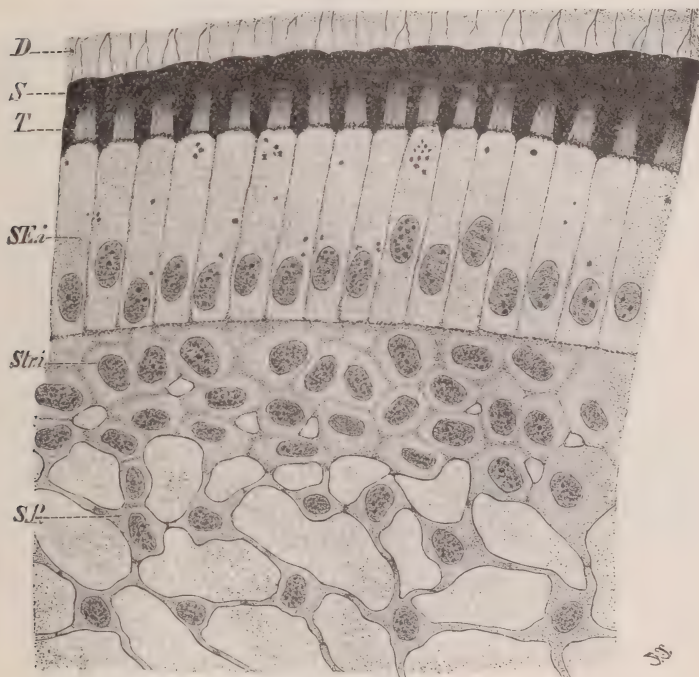


FIG. 4.—Enamel-organ from the cuspid of a young cat. *D*, dentine; *S*, undeveloped enamel; *T*, Tomes's process of the enamel-cells; *SEI*, internal enamel epithelium; *Stri*, stratum intermedium; *S.P.*, enamel-pulp. Zeiss Apochrom. 2.0. comp. ocular. 4. 625 diam. Mährenthal's method (pyroligneous acid).

deeply black by osmic acid. The inner enamel-epithelium is formed of one layer of high columnar cells. From the beginning up to the end of the formation of the enamel, it is the same cells which have the function of depositing that hard substance. Notwithstanding a most careful investigation, I have not succeeded in discovering the so-called reserve cells described by Waldeyer and others. Those authors were doubtless deceived by sections oblique and not sufficiently thin.

Count Spee proved first that the young enamel is stained black by osmic acid; also in the enamel-cells there are found, after treatment with osmic acid, here and there a few black globules, which must be

regarded as the first products of the change of the enamel-cells into the ground-substance of the enamel (Fig. 4, *SEi*). Young enamel has about the appearance of a honeycomb. In the depressions there are processes of the enamel-cells, the so-called Tomes's processes (Fig. 4, *T*). In the enamel-cells, as in the odontoblasts, those ends of the cells which point toward the enamel are changed into enamel; the opposite end of the cell, which contains the nucleus, continues to grow by taking up new nutriment, up to the time when the enamel ceases to form. The last curious horny product of the enamel-cells

FIG. 5.

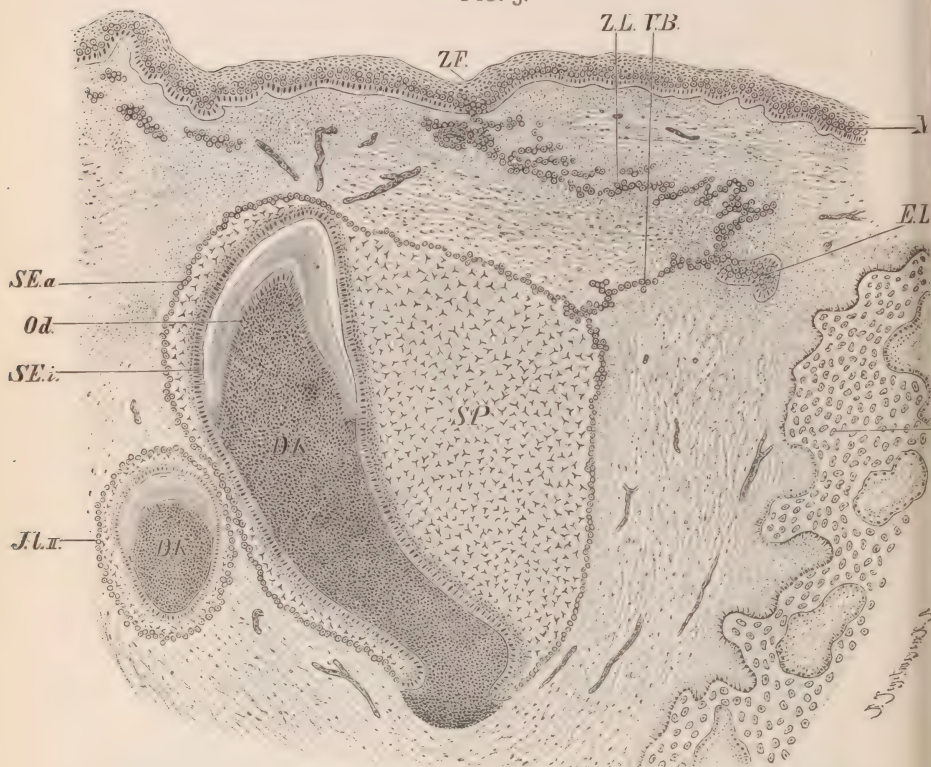


FIG. 5.—Human fetus (30 cm. long). First milk incisor. Frontal section through lower jaw. *D.K.*, dentine germ; *Od.*, odontoblasts; *K.*, bone of the alveoli; *SE.a*, outer, *SE.i*, inner enamel epithelium; *S.P.*, enamel-pulp; *Z.F.*, dental furrow; *M.E.*, epithelium of the jaw; *Z.L.*, dental ridge; *E.L.*, reserve ridge for the reserve tooth; *V.B.*, connecting bridge; *JL.i*, second incisor cut along its periphery. 300 diam.

is the "enamel cuticle." The young enamel is first an organic matrix rich in salts of lime, exactly like the uncalcified dentine. As soon as the proper calcification begins, the salts of lime are deposited first in the prolongation of Tomes's processes, and form thin prisms which are surrounded by a large amount of an organic cementing substance. Also, this substance calcifies by degrees, and so the prisms grow thicker. Finally there remain only faint traces of a cementing sub-

stance between the enamel-prisms. In teeth in which the enamel is not fully developed, we find a larger amount of cementing substance. When the canaliculi of the dentine (dental tubules) reach into the enamel, they always lie in the interprismatic cementing substance. Among the Marsupialia there are so-called enamel canaliculi which, as direct continuations of the dentine canaliculi, run through the entire thickness of the enamel. Tomes states that these canaliculi correspond to enamel-prisms. This view is not correct. On the contrary, I can fully confirm V. v. Ebner's statement that among

FIG. 6.

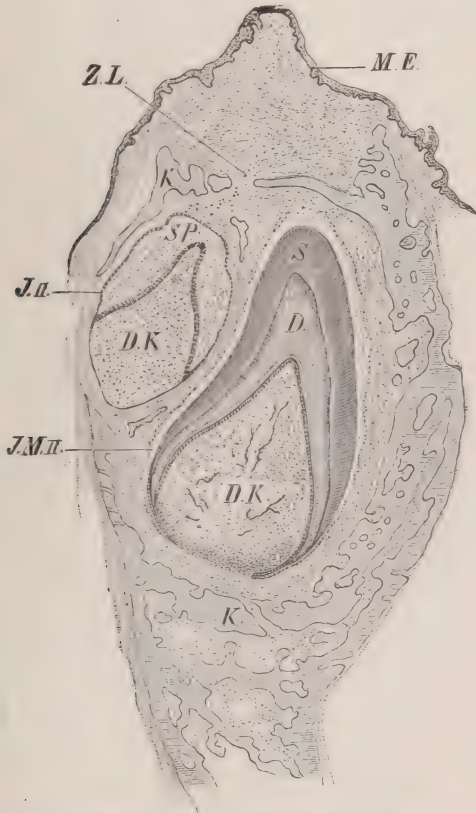


FIG. 6.—Child, three months old. Second milk incisor of lower jaw with its reserve tooth. Ground section after Koch's petrifying method. *JM.ii*, second milk incisor; *J.ii*, second permanent incisor; *D.K.*, dentine germ; *D*, dentine; *S*, enamel; *S.P.*, enamel-pulp; *Z.L.*, remains of the dental ridge; *M.E.*, epithelium of the jaw; *K*, bone of the alveoli. 9 diam.

Marsupialia, also, the enamel canaliculi run in the interprismatic cementing substance.

Still more than the formation of the enamel has the formation of the dentine been, up to the present time, a matter of controversy. V. v. Ebner alone brought some light into this subject also, and showed that the pass-word, "secretion or change?" does not affect the real point of the matter. The chief question in the formation of

dentine, as in that of the enamel, is, whether throughout the whole life-time there is only a single layer of odontoblasts, or whether there are any reserve cells. Notwithstanding a most careful investigation, I have never succeeded in finding even one single undoubted reserve cell of odontoblasts. It is necessary here to study a perfectly complete series of very thin sections. But then it can be shown with absolute certainty, that the so-called reserve cells are exclusively oblique sections of deeper-lying odontoblasts. Waldeyer, who started the doctrine of the reserve cells, has now convinced himself, by my slides and photo-micrographs, that throughout the whole life-time it is only one single layer of odontoblasts which forms the dentine. The very delicate processes in the deposition of the dentine can be observed only with great difficulty. Since V. v. Ebner has in this matrix demonstrated very fine gelatin-yielding fibrils of connective tissue, we must first proceed to study the question, how those fibrils arise.

The view of Kölliker, Rollett, and others is that the gelatin-yielding fibrils are formed, so to speak, by a process of crystallization—by so-called “Prägung”—from the structureless matrix which had been secreted by the connective-tissue cells. Brücke and his pupils assume that the connective-tissue cells grow out into long and delicate fibers, which are changed directly into the fibrils. Grawitz, Flemming, and others say that the processes of the spindle-shaped connective-tissue cells split into connective-tissue fibrils. V. v. Ebner also, on the whole, assumes that the protoplasm of the cells is changed directly into gelatin-yielding substance, *but still he regards the connective-tissue fibrils as a surface product of the formative cells of the connective tissue*. In some cases, V. v. Ebner observed that at first along the surface of the cell a clear mass makes its appearance, not sharply defined from the granular protoplasm, and there the fibrils are first seen. I myself agree with Flemming and V. v. Ebner, as I could observe the direct development of the gelatin-yielding fibrils from their formative cells. I regard as of secondary importance the question as to whether the fibrils arise only along the surface (V. v. Ebner), or by a splitting up of the cell processes (Flemming and others). This matter will probably not be decided yet, as the changes which take place in the formation of those fibrils are, even with our highest apochromatic powers, only on the verge of being visible.

As can be seen from Figs. 1-3, the dentine germ, or the pulp (papilla), consists first of unchanged embryonic spherical cells. When the tooth goes on growing, the cells on the top of the dentine germ form short processes, whilst at the lower end of the root of the tooth the embryonic spherical cells remain unchanged throughout life, and continue to divide actively (Fig. 7). On the contrary, in the cells of the pulp which possess processes, and in the fully developed odontoblasts, we rarely find nuclei in mitosis. Canalis drew attention to this fact, and V. v. Ebner has confirmed it.

As regards the odontoblasts, it is known that in the higher vertebrates they have a columnar shape and lie close together. Thus they have, in surface view, some similarity with epithelial cells. *The odontoblasts, however, are no more epithelial cells than the star-cells of the enamel-pulp are connective-tissue cells*. Exactly as the latter are pushed apart mechanically, so vice versa are the odontoblasts closely pressed together and drawn out by mechanical conditions.

The odontoblasts have, among lower vertebrates, throughout life the appearance of embryonic cells of the pulp, or of osteoblasts (Fig. 9). The transition of the polyhedral and spherical bone-form-

FIG. 7.

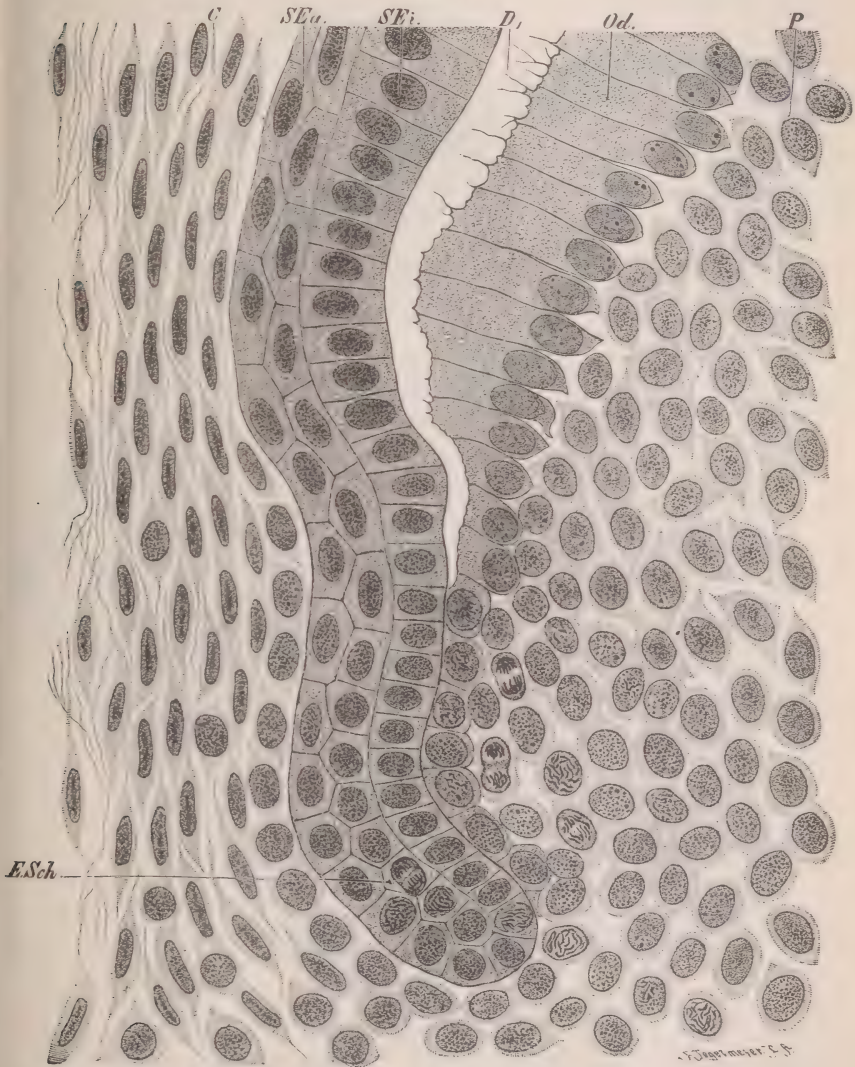


FIG. 7.—Young cat. End of root of incisor with Hertwig's epithelial sheath. *E.Sch.*, section after Mährenthal's method (pyroligneous acid); *P*, cells of the pulp; *Od*, odontoblasts; *D*, uncalcified dentine; *SEi*, inner, *SEa*, outer enamel epithelium; *C*, formative cells of the cement. Zeiss Apochrom. 2.0 comp. oc. 4. 625 diam. Drawn from a microphoto.

ing cells into the columnar dentine-forming cells can be directly traced in reptiles with acrodont teeth,—*e.g.*, in *Chamæleon*. In a similar manner can be demonstrated, during the development of the teeth

of Mammalia, the transition of embryonic spherical cells into high columnar cells (Fig. 7).

The more the deposition of the dentine advances, the narrower in consequence becomes the pulp space. If throughout life the same mass of odontoblasts has to form the dentine, these cells must be-

FIG. 8.

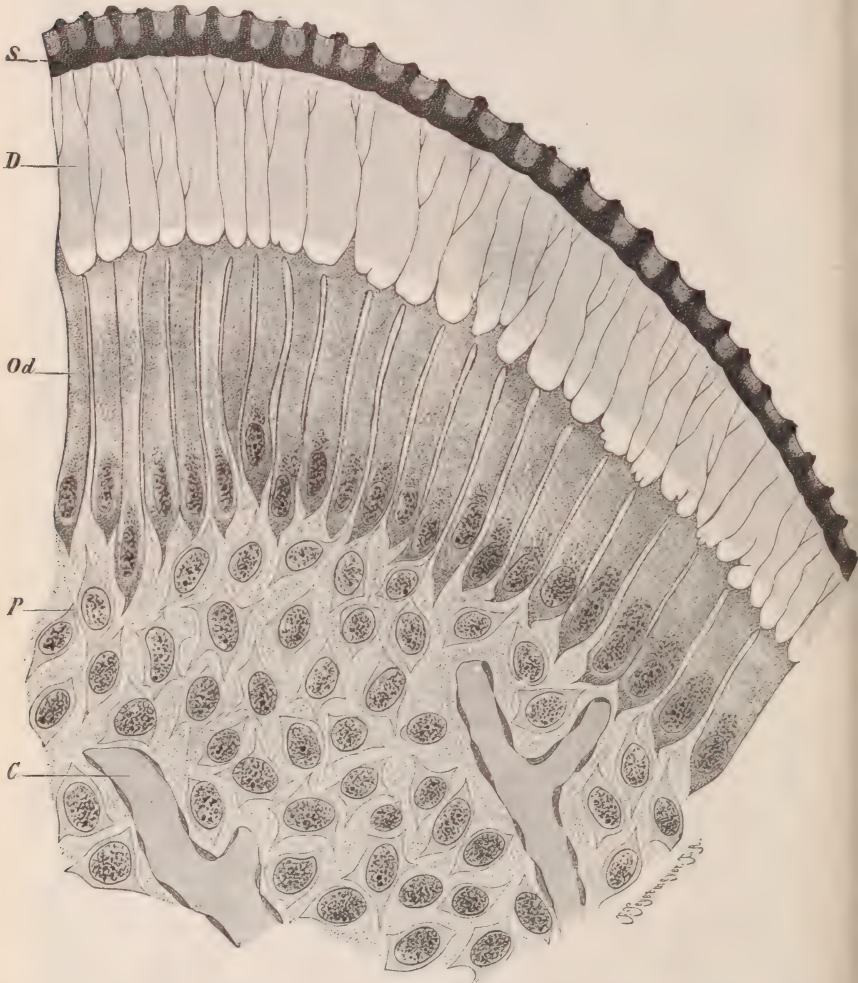


FIG. 8.—Young cat. Top of an incisor. Section after Mährenthal's method (pyroligneous acid). *S*, undeveloped enamel; *D*, dentine; *Od*, odontoblasts; *P*, cells of the pulp; *C*, blood capillaries. Zeiss Apochrom. 2.0 comp. oc. 4. 625 diam. Drawn from a microphoto.

come thinner by degrees. This indeed is the case. Young odontoblasts from the region where the formation of dentine has just begun are short and thick, and have usually *several* dentine processes. Older odontoblasts are long and thin, and have *one* dentine process only (Figs. 7 and 8). Sometimes it may be observed that in preparations the odontoblasts do not lie close together, but have narrow

spaces between them (Fig. 8). These latter no doubt arise by a slight shrinking of the cells rich in water, when they are fixed with osmic acid. But such preparations prove that there is no firm connection between the various odontoblasts, as is the case with epithelial cells.

It is well known that the deposition of dentine on the surface of the pulp continues throughout life. The energy of growth decreases considerably with the increase of age in such teeth where the growth of the root is limited. The growth ceases altogether on some places; on others it continues. It also happens that on places where the deposition of dentine has stopped for a long period, a renewed deposition of dentine (reserve dentine) takes place in consequence of external stimuli. It can easily be proved that in proportion as the energy of growth decreases, so do the odontoblasts decrease in height. In Fig. 10, on the upper end of the pulp the formation of dentine is still going on. This is evident, as here there is still a layer of uncal-

FIG. 9.



FIG. 9.—Protopterus. Odontoblasts, *Od*, from the dental plate of the lower jaw; *VD*, vitrodentine. Ground section after v. Koch's petrifying method. Hartnack 8. Oc. 2.

cified dentine present. In consequence of its extension the odontoblasts have indeed decreased considerably in height, but they still form a continuous layer resembling epithelium. The deposition of dentine has stopped for a time on the other parts of the surface of the pulp, and, concluding from the course of the dentinal tubules, it had been irregular for some time before that. The odontoblasts have here a very much altered appearance, and greatly resemble the osteoblasts. The odontoblasts are at many points no more in connection with one another; after a time these cells, their function having ceased, approach again, in form and mutual position, those cells from which they arose,—viz, embryonic connective-tissue cells.

Even the simple tissue of the normal pulp has been described so differently by the previous writers that one cannot help thinking that some authors described pathologically changed pulps, or artificial products caused by reagents. Indeed, it is not easy to obtain human

teeth with a normal pulp. Without entering into the various erroneous views, I will proceed shortly to describe the histogeny of the pulpar tissue. In Figs. 7 and 8 we see that the embryonic spherical cells send out processes into the root of the developing tooth, toward its lower end. At the same time they are thickly permeated by blood-vessels and nerves. The finest endings of the latter are, when preserved in the usual way with alcohol, sublimate, etc., not always

FIG. 10.

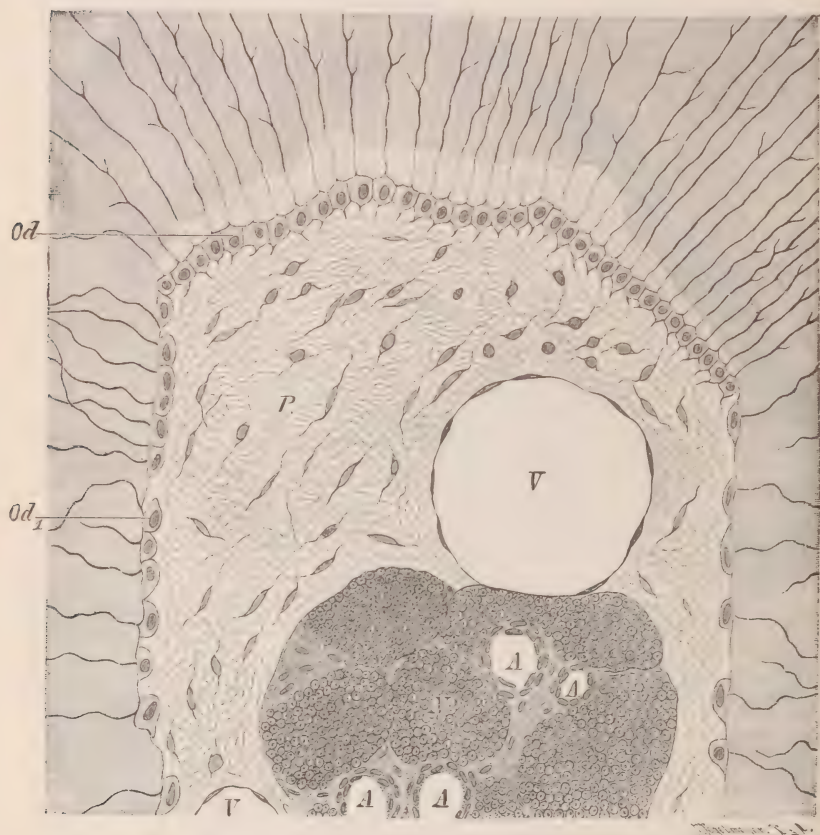


FIG. 10.—Man (forty years). Pulp from the root of a molar. Ground section after v. Koch's petrifying method. *Od*, active odontoblasts; *Od*₁, resting odontoblasts, reminding of osteoblasts; *P*, fibrillæ of the pulp; *A*, arteries; *V*, veins; *N*, nerve. Zeiss Apochrom. 2.0 oc. 2. 250 diam. Drawn from a microphoto.

distinctly visible. *Lymph vessels never occur in the pulp-tissue.* Fig. 8 shows how the embryonic pulp-cells are, with their short processes, imbedded in a homogeneous protoplasmic substance. At a later stage the processes of those cells grow considerably, and cross one another in all directions (Fig. 11). As, in sections, many of those thin processes are cut transversely, the ground-substance has a granular appearance. If we compare the pulp of an older human

tooth with that of a young one, we notice that its structure is not changed, except that the number of the pulp nuclei has decreased considerably. Sometimes we meet nuclei which have become quite rudimentary, and are only slightly stained ("slumbering cells" of Grawitz, Fig. 10). As before, the fibrils of the pulp are *isolated*, and cross one another in all directions. As a rule, a joining together of these fibrils to form connective-tissue bundles does not occur normally. Fibrils joined together to form connective-tissue bundles can be observed in old pulps only in the neighborhood of blood-vessels and nerves, and also in diseased pulps. These *connective-tissue bundles* consist, no doubt, of gelatin-yielding fibrils. The question arises, Are the isolated fibers of the pulp also gelatin-yielding fibrils, or are they metamorphosed processes of cells?

FIG. 11.

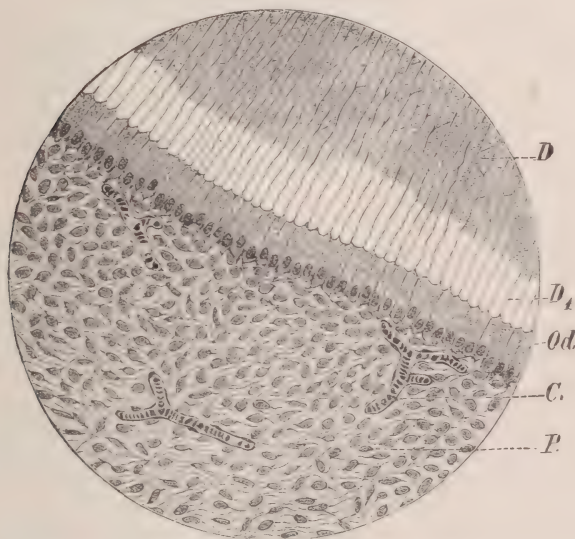


FIG. 11.—Child (seven years). Ground section through the root of the first lower molar. After v. Koch's petrifying method. *D*, calcified dentine; *D*₁, uncalcified dentine; *Od*, odontoblasts; *C*, blood capillaries; *P*, cells of the pulp. 200 diam. Drawn from a microphoto.

The older authors, like Waldeyer, Kölliker, Tomes, hold the latter view, and are therefore right in comparing the pulp with the embryonic connective tissue. V. v. Ebner, on the contrary, believes that the majority of the pulp-fibers are gelatin-yielding fibrils. He gives the following reasons: (1) the strong positive double refraction; (2) the swelling up of the pulp-fibers when acids are added. Both phenomena have up to now been observed in gelatin-yielding fibrils, but not in the processes of ordinary embryonic cells. V. v. Ebner thinks it scarcely probable that whole cells are used up for the formation of ground-substance.

Although agreeing in almost all other controversial points of dental histology with V. v. Ebner, I cannot help questioning this one. First of all, the gelatin-yielding fibers are found in the animal body almost invariably connected in bundles, between which run sap-spaces or clefts.

Such connective-tissue bundles are found also in older pulps only in the perineurium and in the adventitia of blood-vessels. All other fibers of the normal pulp run isolated and irregularly through each other, and are also on the average considerably thicker than the exceedingly delicate gelatin-yielding fibrils.

(To be continued.)

A SIMPLIFIED METHOD FOR THE DISINFECTION OF DENTAL INSTRUMENTS.*

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FOR a long time I have occupied myself with the study of a method of disinfecting our instruments which would meet the well-known requirements. The necessity of such disinfection, not only in private practice, but particularly in the clinic, where a great number of patients, many of them unused to habits of cleanliness, occupy the operating-chair in quick succession, has long been one of the burning questions.

However much we appreciate the excellent investigations of Miller‡ in this direction, we are unable to ignore the weak side of the method followed by him, as well as of the method of disinfecting instruments generally in use. The method is unpractical, partly on account of the disagreeable odor, partly from its cauterizing property, particularly from the time consumed in its application, and last, but not least, its many details. The difficulty consisted, therefore, in finding a method which would fulfill not only the conditions of proper disinfection, but also the practical requirement of being easily applied. All the known methods of disinfection (cauterizing fluids, hot water and hot air, the sterilizer, etc.) show themselves to be too detailed for dental practice. We have to deal here with much too large a number of instruments; and the process of continually introducing instruments into an apparatus, and then waiting for them to dry, either requires the employment of some one specially as disinfector, or occasions a loss of time that only the practice of a beginner would allow. Miller used infected glass vessels and lead shot instead of instruments. I have preferred rather to infect the instruments themselves, and to do it in the same way as they are actually infected, by practical application in the mouth of the patient. The purpose of disinfecting instruments is of course merely to prevent the transferring of an infection from the mouth of one patient to that of another; and if after disinfection the instruments are absolutely sterile, the method is shown to be perfect. If absolute sterility cannot be obtained, if only a few

* By special arrangement with the author, published simultaneously in the DENTAL COSMOS and the *Oester-ung. Vierteljahrsschrift für Zahnheilkunde*.

† These investigations were carried out in the dental clinic and laboratory. I was helped by the commendable efforts and zeal of assistant Dr. L. Hattay, and the practitioner Mr. Ed. Hallosy.

‡ "Mikroorganismen der Mundhöhle," 1892. Leipzig, George Thieme.

germs remain, we still have a method of disinfection that will be fairly satisfactory for practical purposes.

The question is now to find a method, in the application of which we can fulfill the two conditions of sterilization—the mechanical as well as the chemical—in the one act.

The aim of the experiments was therefore, first, to save the time consumed in a mechanical cleansing; secondly, by the application of the strongest agencies possible to shorten their time of application as much as possible. Then if we dispense with a complicated apparatus, etc., we have a method of disinfection capable of practical application. For this purpose I filled a glass vessel* (length 16, breadth 10, depth 11 c.m.) with coarse building-sand which had been sterilized in a hot-air sterilizer for six hours (until it was roasted a deep brown). The disinfecting fluid was then poured upon this sand-bath until it was thoroughly soaked. A sterilized (sublimated) piece of pasteboard or a glass cover rests upon the vessel when not in use. Two centimeters from the top the vessel is left empty. Every instrument, whether a pair of pincers, scissors, scalpel, excavator, mirror, probe, pincettes, or drill, is then pressed into the sand as far as necessary, and passed through it two or three times (sharp instruments, scalpel, etc., with the backs downward). The sand removes mechanically any particles clinging to the instrument. If they have become partly dried, they are dissolved by the dampness of the sand. When specially necessary, the instrument is left standing for some time in the sand. When it is taken out again, it is only necessary to wash off the clinging particles of sand, either in a solution of the same agency or in some other fluid, which can be kept in a preparation-glass (with a ground-glass stopper) beside the sand-bath; or instead of this a coarse flannel cloth can be used, in the fibers of which the sand will remain clinging. Instruments which have joints must be freed from sand by a tooth-brush, if it has not all been washed off.

I have had this method in operation since August, 1892, and find it so satisfactory that I have introduced it into the dental clinic of the university, in such a way that every operating-chair has a small disinfecting apparatus of this sort. In this connection I may remark that the wash can be used at the same time for the disinfection of the fingers of the operator.

I believe this sand-bath can be used as a means of sterilization at least a month without any danger. Even then the sand would excel the hot-air sterilizer. In a private house, where such an apparatus is not at hand, an ordinary dish from the kitchen may be used; this, together with the sand, roasted over the fire or over a strong flame, will fulfill the purpose.

The satisfaction which this method of disinfection has given me has caused me to communicate it to my colleagues in the profession. Perhaps it will meet the wishes of some one.

To the use of the sand-bath as a means of mechanical cleansing was joined a small series of agencies as chemical disinfectants. This formed the substance of a series of investigations in bacteriology which I will give here as briefly as possible.

* If necessary, such glass vessels can be procured from Weiss & Schwartz, Vienna.

First Series of Experiments.

Agencies :

1. Four per cent. sublimate solution in the sand-bath, with previous washing in chloroform.
2. Four per cent. sublimate solution without chloroform.
3. Concentrated lysol (100 per cent.).
4. Fifty per cent. lysol solution.
5. Fifty per cent. phenosalyl solution.*
6. Twenty per cent. phenosalyl solution.
7. Twenty per cent. boiling soda solution (according to Miller, for the purpose of comparison).
8. Electricity.

The method followed in the experiments was as follows : In every experiment four mouth-mirrors and twenty-four excavators were infected as thoroughly as possible from a number of clinical patients. Strongly carious and gangrenous teeth were used particularly.

The infected instruments were immediately scraped through the sand and then shaken in the wash ; then all the instruments were put into sterile, distilled water, the latter for examination. The sand which was infected by the instruments and the fluids were given a thorough examination, everything separately. The sand was, immediately after the process of infection, absolutely sterile (bouillon-culture, gelatin and agar plates) : the same was true of the fluids.

After the sand was dry,—the sixth day,—the upper layer of the sand, which had stood under cover, was taken, and the breeding experiments given above were begun with it. It was no longer impossible to discover absolute sterility ; on the sand-cultures we found from the fourth to the twenty-second day on every three plates (gelatin) an average of forty colonies. The same was true of the fluids. But all the colonies were shown to be air-bacteria, and were not pathogenic. We are therefore justified in assuming that the sterile sand-bath, even after having partly dried,—which can be prevented by moistening it daily,—can be used for a month, or even longer, before it is necessary to resterilize the sand.

Twenty-one experiments were begun in all, of which, however, thirteen were spoiled by small accidents or mistakes, and had to be discontinued. But there remain eight thoroughly tested, faultless experiments. The following results are of course based exclusively upon these eight experiments.

Duration of the Operation.—Every instrument was scraped three times through the sand-bath, and afterward, as I stated, washed off ; this occupied twenty to thirty seconds. (Experiments 1-6.)

* Phenosalyl, a new antiseptic compound presented by Dr. F. von Christmas, Paris. In order to show that phenosalyl really meets the demands, at least as set forth by Dr. Christmas, we thought well to institute some test experiments, which convinced us that we had before us a useful means of disinfection. We took bouillon, pure cultures (twenty-four hours and two weeks old), from *Pneumococcus* and *Staphylococcus pyog. aureus*. The method was the one first introduced by Gersim ; that is to say, several drops were poured into ten c.cm. antiseptic solution, and mixed with it by shaking. Exactly one minute later one drop was put again into ten c.cm. nutritive bouillon, and placed in the incubator. Result, the same as that obtained by Christmas ; that is to say, complete sterility.

In experiment 1, chloroform and afterward sterile distilled water were used as a wash ; in the other experiments (2, 3, 4) only distilled water was used. If, as we may assume, the instruments were sterile, or at any rate disinfected, this distilled water ought to remain sterile or suffer at most a very trifling infection, by means perhaps of spores more capable of resistance.

Experiment 7 is merely for comparison ; the instruments, infected like the former ones, were placed for two minutes in a boiling saturated solution of soda.

In experiment 8, fifteen Leclanché cells were used (the same electrical force will serve to operate the drill, hammer, and mouth-illuminator). The electrodes were inserted in the sand-bath, and the instruments were taken out of this, and passed, in the way described above, through the fluids. The operation occupied in this case (the electricity in the sand-bath) two minutes.

Bacteriological Investigations.—In every single case three platinum needles each, from the sand as well as from the chloroform and the distilled water, were placed in bouillon, the clinging drops examined for moving micro-organisms, and gelatin and agar plates treated in the regular manner. In experiments 7 and 8, the plates were treated both before and after the boiling or the application of the electrical current.

The time of incubation during the breeding experiments was observed to be : upon gelatin, twenty-four to forty-eight hours ; upon agar, three to seven days.

Promising experiments with electricity (strong constant current) have lately been instituted by d'Arsonval and Charrin (*Bull. Med.*, No. 53, 1893). From the account so far given we quote the following : "We have before demonstrated that electricity influences the secretion of the bacill. pyocyaneus and reduces its chromogenous properties. To-day, thanks to new data, we are in the position to prove that the electrical current even affects the development of the spores, inasmuch as the number of cultures arising out of them is reduced. This result can be attained in five instead of thirty minutes, as we found it before. In this way we shall succeed gradually in killing off cells, provided the bacilli are subjected for a long time to the effect of very strong currents."

Our own investigations were limited to a single decisive experiment ; and although the electrodes were also introduced (beside the manner stated) into test-tubes filled with pure cultures, and therefore a relatively large current was operating upon a small volume, nevertheless fifteen Leclanché cells were shown to be too weak to produce bacteriocidal effects.* We shall continue experiments in this direction. Even though strong currents do not have a direct effect upon the micro-organisms, we can still confidently assume that by the separation of the ions they interfere both with their nourishment and their secretions (toxines), and in this way withdraw from the micro-organisms the conditions of existence. This we can assume as the basis for decisive experiments.

* The experiments of Apostoli and Laquerrière were likewise purely negative by means of fifty to three hundred milliamperes. (*Semaine Med.*, 1890, No. 19.)

The following table gives in more convenient form the results of the bacteriological examination :

	Time of Incubation.	NUMBER OF COLONIES ON THE DIFFERENT BREEDING SUBSTANCES.				EXPERIMENTS WITH ANIMALS.	
		Bouillon.	Gelatin.	Agar-agar.	Like Colonies.	Non-pathogenic.	Pathogenic.
1. Four per cent. sublimate solution in sand-bath, with subsequent washing in chloroform and then in four per cent. sublimate solution.	48 hours.	Small, delicate, white flakes clouded.	18	Within 48 hours many white colonies.	7	7	0
2. Four per cent. sublimate solution without chloroform.	48 hours.	Strongly clouded.	24	A film covering the whole surface in folds.	6	6	0
3. Concentrated lysol (100 per cent.).	48 hours.	On the bottom, small cuticle.	15	Cuticle in cracks, without luster and color.	6	6	0
4. Fifty per cent. lysol.	48 hours.	On the upper layer, a thin film.	49	Very soon a broad, shining coating.	13	12	After subcutaneous inoculation death within 4 days. The micro-organisms appear exclusively in the blood.
5. Fifty per cent. phenosalyl solution.	10 days.	Very delicate flakes.		Sterile after ten days.			
6. Twenty per cent. phenosalyl solution.	10 days.	Remained completely sterile.		Remained sterile.			
7. Two per cent. boiling soda solution.	8 days.	The nutritive substances remain sterile.					
8. Electricity (fifteen Leclanché).	24 hours.	Very much clouded.		Twenty-four hours later countless colonies.			

Second Series of Experiments.

Inasmuch as in the first series of examinations of the infected matter the fluid (80 c.cm.) may have been too largely diluted, test experiments in the following manner seemed to be indicated. The infected instruments were passed through the sand-bath, afterward washed off with distilled (sterile) water, shaken, and then applied (*i.e.*, pressed in) to oblique layers of gelatin and agar in test-tubes. The following table shows the result :

	Time in Minutes.	No. of Instruments.	Sterile.	Not Sterile.	Not Pathogenic.
One per cent. sublimate sand-bath	0.40	5	2	3	5
One hundred per cent. lysol . . .	0.30-0.40	5	3	2	5
Twenty per ct. phenosalyl solution	0.30-0.40	5	1	4	4*
Two per cent. boiling soda solution	3.0	5	5	0	0

Third Series of Experiments.

In order to show what degree of disinfection of surgical instruments is reached by other institutions immediately before applying them, we procured from a gynecological clinic and from the surgical division of a general hospital sterilized instruments that we could place in test-tubes, in order to compare them with our own results. We give the results as follows :

At the gynecological clinic it is the custom to boil the instruments half an hour in a two per cent. solution of soda ; from that they are placed in distilled water, where they remain until the operation. Then they are drawn out with a hand already disinfected or with an instrument. Instruments sterilized in this way we placed in oblique test-tubes or pressed into the nutritive medium (grape-sugar, agar-agar, gelatin). Result : the incubating surfaces sterile eight days later.

The instruments from the surgical division are boiled in two per cent. soda solution, and then for half an hour placed in a two per cent. carbolic solution, after which they are applied immediately. The same method of experiment was followed here as in the previous case. Result . Forty-eight hours later, air-bacteria were developed in scattered colonies. With the latter matter (see table 3) two mice were inoculated (pocket-inoculation). On the same day symptoms of inflammation (erythema, swelling) appeared in one mouse, but disappeared entirely on the following day. The inoculation was without effect upon the other mouse.

	No. of Instruments.	Sterile.	Not Sterile.	Not pathogenic.	Pathogenic.	Remarks.
Gynecological clinic . . .	5	5	0	5	0	
Surgical division . . .	5	3	2	3	2(?)	No pus.

* The micro-organisms caused an abscess lasting a short time.

Résumé.

From the standpoint of practical applicability, the investigations given here have produced the following results :

1. The sand-bath shows itself to be a rapid method of mechanical cleansing, and replaces the customary brushes and soap.

2. The shortening of the time occupied in disinfecting by the application of concentrations of energies, as directed above, is admissible, since (a) sublimate, even in four per cent. solution, will not injure steel instruments when acting only a short time as directed ; (b) lysol and phenosalyl not at all.

3. By having fifty per cent. alkali soap as an ingredient, lysol has the useful property of saponifying the fatty part of the infected material in order to allow the other part of it, the cresols, to operate.

4. Chloroform used before the sublimate, in order to hasten and intensify its effect by removing the fat, seems to have no particular effect.

5. Mercuric chlorid, when applied in the way directed, with the help of sand-cleansing, is shown to be admissible for disinfecting instruments as well as lysol and phenosalyl ; although bacteriological experiments can show no absolute sterility, yet the cultures that sprang up were shown not to be pathogenic.

6. In connection with the boiling soda solution suggested by Miller (*loc. cit.*, pp. 276, 277) we can conclude, after having made the two experiments, that it presents a method which will produce absolute sterilization, the plates remaining entirely without growths.

7. The experiments with the strong electric current gave no positive result, and further experiments ought to be made to get more exact results about this question.

8. The second series of experiments produced results agreeing with those of the first series ; but the phenosalyl appeared here in a less favorable light. Perhaps it was caused by the absence, in this case, of the dilution.

9. It appeared from the third series of experiments that the method of disinfecting instruments for general surgical purposes is an admissible one, and it only remains to prevent as much as possible the gathering of air-bacteria.

Reviewing these results, we have :

I. Absolute sterility is always desirable, and can perhaps be attained by means of apparatus (sterilization) and by boiling soda solution ; but

II. Every method of that sort requires much time, a number of alternating instruments, and perhaps a special person as disinfecter ; and leaving this out of account, we have the annoyance of summer heat and steam in the operating-room.

III. Beginning with absolute sterility, we have a series as follows : (1) two per cent. boiling soda solution ; (2) four per cent. sublimate solution in sand-bath, with a subsequent washing in chloroform and then in two per cent. sublimate solution ; (3) four per cent. sublimate solution without chloroform ; (4) concentrated lysol (100 per cent.) ; (5) fifty per cent. lysol solution ; (6) fifty per cent. phenosalyl solution ; (7) twenty per cent. phenosalyl solution ; (8) electricity.

IV. The method proposed here for the disinfection of dental in-

struments is nearly equal to the method generally used for surgical instruments, and there is no good ground for depreciating it, since the air-bacteria occur in one case as in the other.

V. None of the methods of disinfecting instruments previously known fulfill to the same extent all of the four requirements,—viz, absolute sterility, simplicity, no injury to the instruments, and rapidity; and it remains for the future to perfect a method, possibly by means of electricity, that will with one stroke satisfy the wishes of all.

HISTORY OF DEFORMED VAULTS.

BY EUGENE S. TALBOT, M.D., D.D.S., CHICAGO, ILL.

(Read before the Pan-American Medical Congress, September 7, 1893.)

It is a singular fact that depressed palates and irregularities of the teeth were first observed and described by medical men. Langdon Down called the attention of the medical profession to the fact that high vaults, as well as irregular-shaped jaws, were very common among idiots and congenital imbeciles. In a paper read before the Odontological Society of Great Britain he says, among other things, speaking of idiots in the Earlswood Asylum, "Of the most significant value, however, is the condition of the palate. I have made a very large number of careful measurements of the mouths of the congenitally feeble-minded and of intelligent persons of the same age, with the result of indicating with some few exceptions a markedly diminished width between the posterior bicuspid of the two sides. One result, or rather one accompaniment, of this narrowing is the inordinate vaulting of the palate. The palate assumes a roof-like form. The vaulting is not simply apparent from the approximation of the two sides; it is absolute. An appeal to the condition of the mouth is an important aid in determining whether the lesion on which the mental weakness depends is of intra-uterine or post-uterine origin. In the event of the mouth being abnormal, it indicates a congenital origin; while if the mouth is well formed and the teeth are in a healthy condition, it would lead to the opinion that the calamity had occurred subsequently to embryonic life." Indeed, he went so far as to state that these conditions when observed in young children were pathognomonic of idiocy.

My own studies prior to the year 1887 not only show high and contracted arches among sane individuals as well as idiots, but that they are also very frequently observed among the deaf, dumb, blind, insane, criminals, drunkards, extreme tobacco-users, extreme egotists, in neurotics and degenerates generally.

It will be noticed, therefore, that no particular class of individuals is exempt from these deformities. The frequency with which they are observed in each class will be studied later. The fact that the high vault and contracted arch are not confined to any one class of individuals would prove conclusively that the high vault is not due to mental weakness. Dr. Clay Shaw (*Journal of Mental Science*, July, 1876) made extensive observations and accurate measurements of the mouths of idiots, and decided that "there is no necessary connection between a high palate and the degree of mental capacity of the indi-

vidual." These deformities are never observed in connection with the first set of teeth. (I shall show later that they always form between the sixth and twelfth year.) The fact that they are developed in utero, or are of congenital origin, or a forerunner of idiocy, as advanced by Dr. Down, is entirely out of the question.

Dr. Clay Shaw believed that a high palate is invariably associated with narrow pterygoid width, and a narrow skull, but this theory is of little value. By a close examination of the vaults of the dolichocephalic heads it will be seen that such is not the case, but that they are also to be seen among the brachycephalic and mesocephalic heads.

DESCRIPTION OF THE VAULT.

The roof of the mouth has received different names from different authors. One speaks of it as the arch, another the dome, still a third the palate. The word arch, although used in its proper place, is so often liable to be confounded with the dental arch, that one is apt to become confused. Thus we frequently read of the V or saddle-shaped arch, and we are quite unable to decide whether the writer intended to refer to the dental arch or the roof of the mouth. The author has in former papers used the term vault to distinguish it from the dental arch, and will therefore continue its use in the present essay.

The vault of the mouth is made up of the hard palate, the soft palate, and the alveolar process. The hard palate consists of two horizontal plates of bone extending from the superior maxillary bone upon either side and uniting at the median line, and from the anterior alveolar process in front it extends back on an average of two inches, when it unites with the soft palate. The hard palate is composed of six distinct parts: two incisive bones, two palate plates of the superior maxillæ, and two horizontal plates of the palate bones. The incisive bones, however, become so firmly united to the maxillary plate of bone so early in life that the suture becomes obliterated. The period of ossification of the median suture varies in different individuals: sometimes as early as the third and fourth years, and again as late as the fifteenth and sixteenth years.

The author, in widening the arch by means of a jack-screw, has opened the suture of the median line in fourteen different cases in children from twelve to sixteen years of age. This was accomplished by very little pressure, showing that union had not taken place.

As a whole, the hard palate may be described as a horizontal partition or floor separating the nasal cavity from the mouth. The anterior part of the palate bone unites with and becomes a part of the alveolar process. The upper surface of the hard palate joins the floor of the nasal passages, which are divided in the center by the union of the vomer. This bone, which is quite thin at its middle portion and cartilaginous at the anterior part, begins to thicken as it reaches the floor of the nose, at which place it gradually produces a smooth appearance, dividing the nostril into two rounded arches.

Upon the palatal surface it is very uneven. Along the median line we frequently find a rough ridge of bone resembling a section of rope, running its entire length, about the size of a slate pencil. Such a condition is frequently observed in Peruvian skulls. Out of two hundred and twenty-eight examined at the Peabody Museum, Harvard College, sixteen had this peculiar appearance. In more modern

skulls, we find knots or rough lumps of bone at intervals along the suture. Again, we will observe a thick band of bone from .25 to .50 of an inch in width, extending part way or the entire length of the suture. This thickness or prominence commences at the alveolar border and becomes the widest at the second bicuspid and first permanent molar, where it gradually narrows to a mere point at a line drawn across the vault at the posterior surface of the second molar.

The hard palate varies in thickness in different localities, and differs in thickness in different individuals. Around the edge where it unites with the maxillary bone and alveolar process it is quite thick, and also at the median line, while about midway between these two parts the bone is as thin as tissue-paper. I have also observed it from .12 to .18 of an inch in thickness. At the median line and just back of the incisors we find a fossa which transmits the anterior palatine vessels and naso-palatine nerves. At the posterior surface upon either side is a groove and an opening for the transmittance of the posterior palatine vessels and nerves. Both the upper and lower surfaces of the hard palate are covered with mucous membrane, which extends backward and unites to form the soft palate. Between the two folds of mucous membrane are muscular fibers for the purpose of moving the soft palate in different directions. The shape and length of the soft palate depends upon the distance between the œsophagus and the edge of the hard palate. If the head of the individual is dolichocephalic or long, the soft palate will curve slowly backward, thus producing quite a long space between the incisor and uvula. On the other hand, if the person possesses a brachycephalic or short head, the soft palate will curve abruptly, thus allowing only a short distance in the vault of the mouth. I have observed mouths where the head was so short from before backward that the soft palate descended nearly straight down without the slightest curve.

The vault, taken as a whole, presents different shapes in different individuals.

NORMAL DEVELOPMENT OF THE ROOF OF THE VAULT.

If we examine the mouth of a child at the fourth or fifth year, we find a well-developed jaw. The curves are all graceful in outline, and the contour of the dental arch is well formed. This could hardly be otherwise, for the reason that the jaw is growing rapidly for the purpose of accommodating the permanent teeth, and the circle of the alveolar process is larger than that of the teeth. Spaces exist between the teeth, and therefore crowding cannot take place.

We could not expect to find two vaults alike in height, width, or contour, although each is normal in itself. In the development of the jaws we have two structures, the hard dense bone of the maxilla and hard palate, and the soft, spongy bone, the alveolar process. The maxillary bones develop and unite at the median line. The contour of the top of the vault is now established. It is held in position, on the sides, by the walls of the antrum, supported by the malar process and by the anterior alveolar process and maxillary bone. In this manner the vault is held in its natural position. The maxillary bones, like all the other bones of the head, develop in every direction in a general way, until the growth is established. Between the ages of four, when all the temporary teeth are in place, and twelve and

fourteen years, when all the permanent teeth are in position, great changes take place in the shape of the jaw. This change is nicely illustrated in Figs. 1 and 2.

Fig. 1 illustrates the face of a girl, three years of age. All the bones of the face and head are undeveloped. The bridge of the nose is sunken; the upper lip is short, as well as from the lower lip to the chin. How different the appearance of the same girl at thirteen (Fig. 2). While the width from cheek to cheek has not changed to any great extent, the length of the face from the chin to the top of the head is very marked. No part of the face has changed more than the lower from the nose down. This change is due partly to the change in the angle of the lower jaw, and partly to the development downward of the superior alveolar process. In young life, the lower jaw presents an obtuse angle; this gradually changes until at middle life it assumes a right angle. In order that the alveolar pro-

FIG. 1.



FIG. 2.

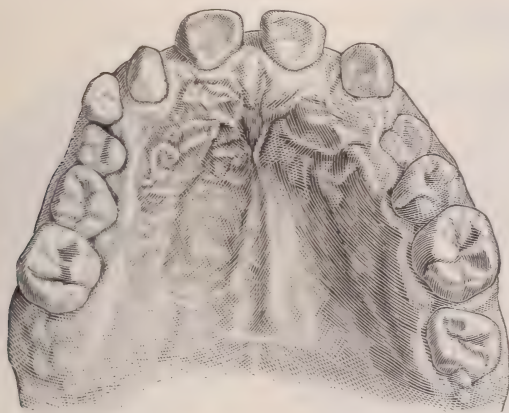


cess and teeth may compensate for this change as the second set comes into position, the alveolar process lengthens with the eruption of the teeth. This is proven by the location of the mental foramen, which is situated at the superior border of the lower jaw early in life, and at middle life just midway between the upper and lower borders of the bone. The same changes take place in the upper jaw. This is quite noticeable on the sides of the alveolar process at the roots of the first permanent molar, soon after it has erupted. Upon examination we shall observe what seems to be a depression, but by careful examination we find that it is a lengthening of the alveolar process. When the crowns of the bicuspid are ready to advance, and absorption of the roots of the temporary molars takes place, there is some irritation in the alveolar process. The first permanent molar coming into position advances farther than the line of articulation of the temporary molars, and the pressure of the jaws rests upon the first permanent molars. This fact, together with the irritation already mentioned, has a tendency to lengthen the alveolar pro-

cess, so that when the bicuspid come into place there is a difference in the height of the vault. There are plenty of illustrations to show this development of the alveolar process, and every practitioner of dentistry has observed it.

One of the most common illustrations is that when the molars upon the lower jaw have been extracted, the molars upon the upper jaw (for want of antagonists) drop down by the lengthening of the alveolar process. The difference in the height of vault when the temporary teeth are in place and when the permanent teeth erupt is nicely illustrated in Fig. 3. This cut shows the permanent incisors and first molars in place. Note the lengthening of the alveolar process. In this manner we obtain the difference in the length of the face. In those cases where the vault is very high, the alveolar process is always very long and thin. The depth of vault is also governed by the angle of the jaw. Thus, if from inherited constitutional disease, such as consumption, syphilis, etc., arrest of

FIG. 3.



development of the maxillæ should ensue, the angle would not change from an obtuse to a right angle. It will be noticed that when the mouth is opened the anterior part has to travel a greater distance than the posterior part, hence either the anterior inferior alveolar process will elongate, so that the lower incisor will articulate with the upper, or the anterior superior alveolar process will elongate to meet the lower incisor and bicuspid. Occasionally this will take place in both jaws. In either case the superior alveolar process becomes long and thin, and the vault is quite high. In cases of arrest of development of the bones of the nose, and adenoid growths, when it is impossible for the child to breathe through the nose, and mouth-breathing is a necessity, the jaws are separated, and the teeth not having a resting-place, the alveolar process elongates, and a high vault is almost always noticed; hence the reason why imbeciles and all degenerates who keep the mouth open, as a rule, have high vaults. The high vaults and prominent teeth and upper alveolar process due to this cause are nicely illustrated in Fig. 4. On the other hand, we occasionally notice the jaws brought closely together. This is due

(1) to a short rami; (2) to right angles of the rami to the body of jaw; (3) to arrest of development of the alveolar process, and (4) to teeth with short crowns, or teeth not fully erupted. In such cases the vault is low, the alveolar process thick, and usually the lower jaw is quite broad. The lips pout; the face is short and broad. Frequently the upper jaw is arrested in its development; the muscles of mastication are very set and rigid. Such a case is illustrated in Fig. 5.

The height of the vault, then, is not due to the roof's being pushed or pulled up by a pressure exerted through the vomer, by the development of the sphenoid bone, nor does the shape of the base of the skull in any way affect it, as I have already explained. The height is due entirely to a growth downward of the alveolar process and teeth. The extent of the development of the alveolar process depends upon nature's becoming satisfied with her architectural figures, and harmonizing the jaws, alveolar process, and length of teeth. That

FIG. 4.



FIG. 5.



the distance in height is changed from a child to a person in middle life is demonstrated by the following figures. Thus in three hundred and seventeen children, under five years of age, before the development of the first permanent molar and alveolar process, the lowest vault measured .17, the highest .62, with an average of .42. If, now, we notice the height of vaults in children at different ages, we find, with two exceptions, a gradual advance in the height of the vaults until in four thousand six hundred and fourteen adults' vaults we have lowest .21, highest .84, with an average of .58. It will, therefore, be observed that the height of vault develops about .33 to .25 in depth after the permanent teeth commence to erupt. In nine hundred and eight measurements of the vaults of ancient and modern Romans, Peruvians, Sandwich Islanders, Mound Builders, American Indians, Negroes, etc., the minimum height of vault was .25, while the maximum height was .88, average .53. By comparing these figures with those of modern individuals, the lowest vault is a little higher (.04) than

in modern, and the highest a little higher (.04). The average, however, is a little lower than in the modern vaults of .05, thus showing that the ancient and pure races of individuals possess more uniform and lower vaults than modern. We would conclude, therefore, that the height of the vault depends upon the length of the face from the chin to the top of the head. So far as the height of the vault is concerned, no race, type, sect, or intellect can lay claim to high, medium, or low vaults. They permeate through all classes of individuals.

NORMAL VAULT.

What constitutes a normal vault would be a difficult question to answer. I possess six skulls, obtained under difficulties from a medical college, and not selected for any particular purpose.

The lateral measurement was made between the roots of the second bicuspsids, and the antero-posterior measurement between the central incisors at a point intersecting a vertical line dropped from the posterior nasal spine to the posterior border of the palate bone. The height of vault from a horizontal line extending from the alveolar process on one side to the alveolar process on the opposite side just back of the second bicuspsids.

The following measurements were taken :

		LATERAL.		ANTERO-POSTERIOR.		HEIGHT OF VAULT.	
		in.	mm.	in.	mm.	in.	mm.
No. 1	.	1.31	= 33.22	2.	= 50.80	.37	= 9.42
" 2	.	1.25	= 31.75	2.12	= 53.84	.62	= 15.74
" 3	.	1.37	= 34.79	2.	= 50.80	.43	= 10.92
" 4	.	1.56	= 39.51	2.37	= 60.17	.75	= 19.05
" 5	.	1.62	= 41.12	2.25	= 57.15	.50	= 15.24
" 6	.	1.25	= 31.75	2.12	= 53.84	.31	= 7.87

Nos. 1 and 5 possess very much the same contour of the dental arch, while Nos. 4 and 6 are very broad, with square dental arches. The heights of the vaults are all different, although two are flat, while the others are more or less rounding. If I were to hand you any one of these skulls and ask if it was a normal vault, you would most likely answer yes. Yet all are normal as I view them, while no two are alike.

I have examined hundreds of plaster casts where the teeth were all in a fairly normal position, with similar results. Of three hundred and seventy-two skulls of Peruvians, California Indians, Mound Builders, and American Indians, the lateral measurement varied from 1.12 to 1.75, and the antero-posterior from 1.75 to 2.75, while the height of the vault varied from .24 to .75.

Oakley Coles made careful measurement of a number of skulls, chiefly in the Museum of the College of Surgeons, London, England. The skulls examined fall into two series,—viz, those of European origin, and those of mixed races,—with the following results :

EUROPEAN SKULLS, 34.

AVERAGE LENGTH IN MILLIMETERS.			AVERAGE WIDTH.			HEIGHT.		
Max.	Min.	Average.	Max.	Min.	Average.	Max.	Min.	Average.
58	40	49	42	31	*35	15	5.5	*9

* Taken at second bicuspid.

MIXED SKULLS, 32.								
AVERAGE LENGTH IN MILLIMETERS.			AVERAGE WIDTH.			HEIGHT.		
Max.	Min.	Average.	Max.	Min.	Average.	Max.	Min.	Average.
65	43	54.9	40	29	*35	18	6	*12

In each of the cases that I have examined, the dental arch was in a normal condition. I have also examined the skulls mentioned by Oakley Coles, and I have been unable to find a contracted arch in any of them. If, therefore, in the examination of thousands of skulls having normal dental arches, no two vaults are found to correspond, we must conclude that a normal vault is one where the dental arch is regular and the different outlines possess graceful curves, regardless of height, width, and length.

BY WHAT STANDARD SHALL WE MEASURE THE VAULT?

The width of the vault depends upon two factors: *First*, the development of the jaw-bone proper, and, *second*, upon the development of the alveolar process.

Narrow jaws are rarely observed among the early races or modern pure races. In the examination of the thousands of skulls of early races in the museums of Europe and this country, very few, if any, contracted vaults are found. This is also true of people who lead a quiet life, as illustrated in modern pure races. If the brain is in a healthy condition and the child properly nourished, the jaw-bone will develop in size sufficient to accommodate all the teeth when they erupt. The teeth will crowd against one another as they come into place, and a normal width of arch will be produced. If the brain is defective as a result of some of the constitutional diseases and the jaw should become arrested in its development just before sufficient room had been secured for the teeth, they will crowd against one another, the arch will become broken, and the V or saddle arch, or some of their modifications, will be formed, hence a narrow contracted vault. The amount of contraction depends upon the size of the jaw-bone proper; if the bone has become arrested early, the jaw being small, the contraction is usually very great. The alveolar process depends entirely upon the location of the teeth for its shape and size. Occasionally the teeth, which are small, are inherited from one parent, and the jaw-bone proper, which is large, from the other parent. In such cases the alveolar process will contract until all the teeth antagonize, when a small arch will be produced. It has already been shown that the V and saddle-shaped arches and their modifications are observed as often among low vaults as among high ones, just as we have seen high and low vaults in normal jaws. The contraction is due to arrest of development of the jaw at the time of the eruption of the permanent teeth; the vault may be high or low. What appears to be a high vault, is not in the height of the vault, but in the width. Having now explained the true cause of what appears to be a high vault, if we will refer to Clouston's classification we will find what he calls neurotic and deformed are both one and the same. Both are neurotic, but one is more contracted than the other. Both are due to arrest of development of the maxillary bones.

* Taken at second bicuspid.

In summing up our observations, we find that there are high and low vaults among the ignorant as well as the intellectual, among the colored as the white, among the brachycephalic and mesocephalic as the dolichocephalic, among the deformed or contracted as the normal. The width of vault depends upon the development of the maxillary bones. If it develops to a size sufficient to accommodate all the permanent teeth, it will be a normal vault regardless of height. On the other hand, if arrest of development of the jaw takes place, these deformities result in a V or saddle arch, or some of their modifications. How, then, shall we classify vaults? In the measurement of the height of vaults of eight thousand six hundred and fifty-four ancient and modern skulls in this country and Europe, the highest was .88, the lowest .25, with an average of .53. In the measurement of six thousand three hundred and eighty-seven mouths of living people over twenty years of age, the highest is .84, the lowest .21, with an average of .58.

Taking these figures into consideration, it is safe to average the height at .55. Allowing .15 an inch in each direction, we can call vaults which measure below .40 low vaults, those between .40 and .70 medium vaults, those above .70 high vaults. We could still classify those below .25 very low vaults, and those above .85 very high vaults.

The width of vault between second bicuspid in eight thousand six hundred and fifty-four ancient and modern skulls: Maximum, 1.63; minimum, 1.13; average, 1.36. In six thousand three hundred and eighty-seven mouths of living people over twenty years of age: Maximum, 1.50; minimum, .93; average, 1.19.

The vast difference in the ancient and modern skulls of this country and Europe with those of living individuals, shows conclusively that the jaws are diminishing in size. We must, therefore, arrange a standard by which we are to compare the width of the vaults as we find them to-day, excluding measurements of ancient and modern skulls. Taking the 1.19 as the average width of vault, we will say that any jaw below 1.10 is a narrow jaw, one between 1.10 and 1.40 medium width, and one which measures above 1.40 a wide jaw.

OUR RELATIONSHIP TO MEDICINE.

BY DR. J. C. WALTON, HOWELL, MICH.

A COMMON aim is in itself a most important bond of union. Our ideas and sentiments must, so far as they are formed by text-books, lectures, journals, etc., be cast in that mold of common interest which shapes the physician's character. While we have been nursing ancestral conceit we have been undergoing the influence of the medical authors in our colleges and in our offices. The effect is good. But though of medical kinship, we also show a marked and peculiar tendency to individuality, professional liberty, and freedom of opinion.

If we have a distinct mission, it would seem to be to extend professional liberty, by which good would be done to the dignity of the profession in enlarging our estimate of our collective duty to humanity. Who will be the Bartholdi in dentistry to plan a statue of Liberty Enlightening the Professions?

A real union with medicine, with a common pride in its history and a consciousness of the part we must collectively play, and have played, seems not far from realization. By the opening prospect and the warm sense of developing good-will the idea of a still closer connection appears to be generating in many minds. A vision of this kind has floated through the hope expressed by leading men for the past fifty years. There has been a political possibility always in sight, and a diplomatic acknowledgment of the meritorious achievement of the few was made by the American Medical Association several years ago.

What definite object could there be in such an action, except to benefit dentistry and display the indulgent good-will of *Æsculapius*, who thus good-humoredly pats the dental child upon his precocious head and smiles assent? But we must be directed by the policy of the American Medical Association if such a union is accepted. Its power is irresistible; and, unfortunately, consciousness of irresistible power is apt to incline to aggression. That a majority of men, whom the world calls dentists, are not willing to submit seems so evident that proof is not added.

While there are important elements of unity, there are also important elements of diversity arising from the necessary admixture of mechanics and commercial possibilities, and the large number of shady ethical characters who hold the confidence of the people and are recognized as important men of the dental profession. If mutual privileges were desirable or practicable, no question would here be raised, but there appears a serious impediment to a full realization of the hope that has quickened the pulses of the dental fathers, gone or going soon, and the ambitious and exclusive spirits now active among us.

The constant irritation and frequent broils caused by our code as at present enforced is a serious drawback to our advancement, because as at present administered so much valuable time is wasted at conventions. Between frequent infringements and political intrigue, those who would profit by attendance upon the meetings of state societies are robbed of benefits they have a right to expect. For this there should be an answer, since all admit the good arising from ideal association work, and deplore a meeting that makes exiles. There are conflicting interests in the balance which blind justice holds up to the view of all. Dental diplomats should not blink the issue. The question whether we are two or one, and what course to pursue in either case, is still unsettled. A wealth of brain-power has thus far been wasted, and dead-loads of anxiety expended, and the problem, so far as nine-tenths of us are concerned, still defies solution.

Separation seems impossible. The alliance, financial or otherwise, of medical and dental teachers in our colleges makes too strong a bond of union. The separation would be so unnatural that it would be sure to be antagonistic, and this we could not afford. The connecting link is being brought into plainer view by the excellent work of our college faculties.

Dentistry is a specialty in medicine to-day only as practiced by a few. The connection is really with the few who are distinctly medical in their aspirations, and there is the same lack of warm interest with them in the mass of dentists—the accepted dentist of the world—as with physicians in general. This exclusive spirit has been plainly

observable while professing perfect and desirable amity, and while holding aloft the bait of medical recognition. The anti-medical feeling breaking through the crust of specialty comfort has occasionally caused a muffled disturbance, but failed to revive to any alarming extent the antipathies of the careless. Things cannot remain thus forever.

During the years in which I have had an interest in the best interests of the dental profession, it has been my privilege to meet at nearly all the great meetings many men who have thought freely on these matters, and who have in private avowed or betrayed their convictions that a change for the better was possible, and must some day come. The perpetual dependence of a liberty-loving profession on the moss-grown creed of an allied profession is an arrangement which, though some may be willing to prolong, many deem unreasonable. Its only assignable advantage to dentistry is professional protection,—status elevating,—the child seeking and accepting parental recognition of kinship and direction. But we should be no longer children. It is time to assert our manhood,—to mark a path for ourselves.

Independence or professional union are the courses between which we must choose. The question of our destiny is before us. The medico-phobists have pressed the question on the ground that the supreme moment came some years ago. Those of the other extreme think that if the time ever arrives it must be in the future still. The generous dream of the fathers is entitled to sympathy and respect, but so far as the majority are concerned the aspiration has been void. Good has come out of it because the sentiment has been slightly cultivated, yet others have been estranged by it. Much outpouring of eloquence in favor of professional kinship, a little free denunciation, a step toward realization, a taking in of the prodigal, a taste of the fatted calf, and now the question, "Where are we?"

By the majority, who, tenacious of their separate interests, dislike the hedged-in sensation, the idea is not favored. The number inclined to independent action is hardly increasing; indeed, the sympathy of the young men who, better educated, can appreciate the professional side of the question, and inspired by the repeated appeals addressed to their egotism and ambition, seems well set toward real professionalism. But the movement has found but partial support in the past surely; and in some quarters, probably on the part of its ostensible advocates, independence has been only a cover for piratical commercialism, for which there is a timorous reluctance to openly declare, in the face of popular exclusiveness and conventional sentiment.

This part of our number is totally wanting in unity; individual selfishness and the bad odor of leadership in the cause prevents any concerted action. Can the lesser but more aggressive number absorb, invigorate, and advance the lethargic mass, or will they eventually untie from and thrust off the dead weight of indifferent numbers? There is no barrier to keep the "four hundred" separate from the mass of the profession, except the disinterestedness or laziness of the mass. To those few we are indebted for our literature, our colleges, our societies, and largely our increasing popularity. The relation of the mass to those in advance is the same as is their relation to medicine. The best results will come from an attitude of

amity and full interest, but we of the mass are expected to yield everything. This is not natural; can we do it? The advantages of a warm cohesion to all parties are manifest, and are hardly denied by those who, on what they think higher grounds, oppose the effort. If this were not so, mechanical dentistry would be now a divorced art, —and who dreams of divorcing it to-day? The thought has been excluded for several years.

Such cohesion would insure to us rapid and peaceful progress, remove all impediments to the social elevation of the mass, and permit the profitable privileges which are now the subject of perpetual disputes. By proper concessions from all, the undisputed heritage of professional success and good-will may be enjoyed. It would largely increase the intellectual activities of the mass, now dormant. The professional benefits it would confer, by putting an end to the professional atrophy now so often seen, must be admitted.

Those who protest against yielding a point for the sake of conciliating so many, fall into a singular fallacy, by imagining that a real addition in numbers is necessarily a subtraction in sentiment. Another advantage of a stronger cohesion which presents itself at present is the power which general ethical contentment would have upon the outgoing graduates. We need not here discuss the quackery side of the question. It is sufficient to admit that in all communities there are those who are aliens, unalterable, to what appears to be the public will. Dentistry has its alien parasites. This question cannot be solved.

It is my purpose to proclaim some seeming advantages to a concessionary action. Many must escape, and no estimate is made of the objections. The few objections appear to me mere bugbears. Whether so or not, they have received a regrettable consideration too long. My wish is for the greatest good to the greatest number. The mass are backward, it is true, in education and fraternal activities, because they have been kept back by influences, educational and social, to which our state of comparative isolation subjects us. But we are good men, the most of us naturally courteous and moral as the average of mankind. Some of us have been the victims of corrupting influences, but none are beyond redemption.

Now, are the forces manifest in higher circles adequate to the assimilation of this vastly greater number without granting a concession? Certain it is the mass will continue to practice. They are not to be kept from that by keeping them ostracised, and the present arrangement is the worst for all concerned that could be devised, since antipathies so manifest keep so many under the influences that promise least.

The natural inflow of new blood is coming from a more promising vein, which in time we may hope will effect the desirable change. It is pleasing to note the influx of so many of the flower of our youth. Our satisfaction will not be diminished by their future work. They will not be afflicted by past antipathies and traditions. Such an extension of our numbers is desirable. Organized effort has been the real power. Its machinery and modes of action, uninterrupted, will perpetuate the present conditions. If the relationship at present existing is the best possible, a change is to be dreaded. The distinctive act of the fathers in adopting the medical code was expected

to seal the adoption, but we know it is possible to have a law that is disappointing in its effects. Medical institutions, whether they rest on written creeds or on tradition, require medical minds to operate them, and the mass of dentists have not been, and are not now, rightfully medical men.

For this reason, the result has been disappointing. The day may come, perhaps, when professions will learn that the less law and the more earnestness and honesty they have, the better.

Strong feeling, however, on the subject, like that which presents against infringement of the code, has its chief seat in the cities. In the rural districts there is less care about the subject, yet even here the inclination is spreading slowly. Our fathers sought such a union, in the belief that material benefit would be brought to us, and by agitation for professional union the thoughts of all have awakened more or less. It is a fact that the element that complains most about the restraints of the code vote men into office in our associations who are known to be personally in favor of the code, and may be expected to seek its enforcement.

Just so with our journalists. They have followed the apparently popular trend of sentiment, and none have openly advocated the views of the many. Probably because the many have been so careful to avoid the public expression of those views, our publishers have been in doubt as to the popularity of the views. This class, while numerically powerful, has been aggressively weak. Brains, energy, aggression, count more than numbers. The men possessing these qualifications are found in our colleges, among our association officials, our editors and our leaders generally.

The influences of titles, and admission to aristocratic medical circles of the few, who are anxious to conform to medical rules for the privileges enjoyed, are surprisingly great considering the age of reason in which we live. A sort of gentility is being cultivated by the assumption of superiority to the average practitioner. The strength of all these elements, combined and uniting their powers of influence or intimidation, can be easily understood; and it will be readily believed that in the face of it the expression of sincere opinion has been much restrained. Those who have watched the course of dental opinion during the last ten years will not believe the obstacles to medical guardianship insurmountable; but to overcome them satisfactorily the concurrent efforts of a majority of dental practitioners are required. This in the past has been, and at present is, impossible.

Injury to actual dental pride has occurred. Many believe there would be no less grandeur, but a real and greater gain by independent action. On the other hand, the ties that already bind us to medicine are strong. The keystone that makes permanent the medical arch to-day is the mutuality of effort in our colleges. Negotiations for recognition in the past have been carried on by dentists, and medical opposition need not be reckoned as a serious obstacle to dental liberty any time dental choice may seek it. The dealings of medical authorities with us have been, so far, no cause for pride, but have been all we deserve. After permitting us, indulgently, to do as we please, we are left to our fate, so there is little use of building on that success. Shall we, can we, change our policy?

Individual interests must be kept in subordination to the interests

of the dental profession. Our professional interests are closely allied and securely tied to the medical profession, consequently her interests are our interests. With codes, as with religious creeds or common laws, there is always a prejudice against changing the system that has descended to us from antiquity. Codes, creeds, laws, represent a crystallization of sentiment at a certain stage of evolution, and are usually found in later years to be not adapted to the changes of condition incident to evolutionary progress. Our code has little or no force or merit with the people, and is disregarded in spirit, if not in letter, by the majority of the profession. Many of us, intentionally loyal to the article, secretly believe that the adoption of a more satisfactory and modern setting to the crystal of existing ethical sentiment should be secured. But while the autocratic one-tenth are favored or flattered by it as it exists, and while medicine continues to progress by over-the-shoulder glances at its diminishing influence, there will be no change.

PROCEEDINGS OF DENTAL SOCIETIES.

PAN-AMERICAN MEDICAL CONGRESS—SECTION OF DENTAL AND ORAL SURGERY.

(Concluded from page 1163.)

THIRD DAY—*Thursday, September 7.*

THE section was called to order at 2.30 P.M., Dr. M. H. Fletcher in the chair.

The following paper by Dr. E. A. Bogue, of New York, was read:

PRINCIPLES UNDERLYING THE REGULATION OF THE HUMAN TEETH.

In the great majority of cases, irregularities in the position of the teeth arise from the dental arch being too small. The causes which produce this diminution of size are often obscure. We *say* heredity; we *see* the roots of pulpless deciduous teeth remaining too long in their places, and deflecting the crowns of permanent teeth away from their proper positions. This deflection is generally, though not always, inward toward the center of the mouth.

We *guess* that the failure to masticate properly may in some way, as yet unknown to us, produce these results, as we see them most frequently in those classes where the food is carefully prepared by cooking and made fine for eating.

But be the causes what they may, the effects are certainly present, and the problem before us is so to correct irregularities in the position of the teeth as to produce the nearest approach to the normal arch, which will through its own perfection remain where it is put.

It is only through obedience to the laws governing the growth and development of the child that we can hope to obtain permanence in our results.

The first one to be borne in mind is that the child continues to grow up to eighteen years of age, or later, according to the age at

which the third molars erupt. Eighteen is mentioned because that is the age at which the third molars generally appear; and yet several cases have lately come to my knowledge in which practitioners have advised the removal of the retaining fixture which maintained an expanded arch before even the cuspids were fully erupted, thus losing all that had been gained by months of previous effort.

The second law is that the crowns of the permanent teeth that are packed away in the jaws of the child of six years of age, awaiting their time of eruption, are as large as they ever will be. A fact in connection with this law is that at this age these crowns have no roots.

Another fact is that the central incisors lie outside of and anterior to the lateral incisors, while the cuspids, which develop much later, are almost alongside of the central incisors, being at the same time much higher up in the alveolus. As the roots develop the crowns push through the gum, and at this period a very slight obstacle is enough to deflect these crowns from the position which they should normally occupy into abnormal or, as we should say, irregular positions.

The normal development is of the lower central incisors first, the upper central incisors next, these latter often standing quite apart until the lateral incisors make their appearance, causing a slight approximation.

At twelve to fourteen years of age the cuspids make their appearance, the lower ones some months, oftentimes a year, previous to the upper. These four cuspids, when fully grown, have the longest roots of any of the teeth, and are the firmest in their positions,—so firm, indeed, that if teeth posterior to them are extracted, the remaining back teeth move forward toward the cuspids.

If any of the four incisors are extracted, the remaining incisors drop back toward the cuspids, but the cuspids remain more nearly stationary than any of the teeth in the mouth, and this through life. This is the third law that we need to bear in mind.

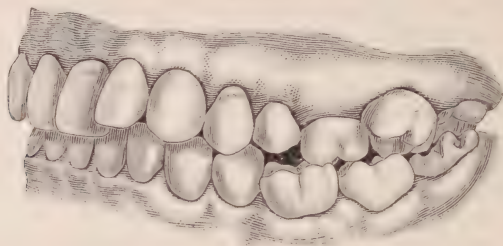
It will perhaps be well, in passing, to recall the fact that the cuspids are, in the lower animals, especially the carnivora, the prehensile teeth; hence it was that they should be the strongest and firmest teeth in the mouth, and the longest to endure. Otherwise these animals could neither catch nor hold the prey upon which their existence depends.

A fourth law to be borne in mind is that the lower molars incline toward the tongue, while the upper molars incline outward toward the cheek. The lower molars develop first, the upper molars afterward; being directed in their course, if normally developed, by their contact with the cusps of the lower molars. This results in the upper molars and bicuspid sitting outside of the outer row of cusps of the corresponding lower teeth. Ignorance or neglect of this law not infrequently has caused the extraction of a bicuspid or a molar during the period of development, the result of which is beautifully illustrated in the two cases which I herewith present. In one of these cases (Fig. 1), the extraction of a lower bicuspid took place. In the other (Fig. 2), non-development of the corresponding tooth on the other side of the mouth brought about practically the same result.

It will be seen that the failure of the molars to properly interlock the cusps as they developed incapacitated the left side of the mouth,

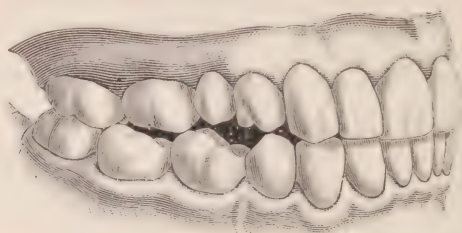
in the case of non-development, completely ; so that the patient never masticated on that side, and the development of the facial muscles was hindered, irregularity of the lateral incisor was produced, and thus the left side of the face of an otherwise pretty woman was

FIG. 1.



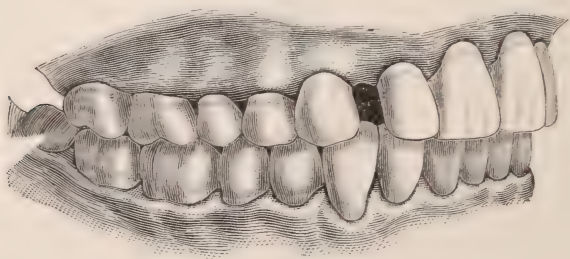
sufficiently unlike the right for her to apply for professional assistance, although at that time she was totally unaware of the cause of the defect, or of the fact that mastication had never been performed on the defective side of the mouth.

FIG. 2.



A sixth law is that the lower incisors normally lean forward, forming a low arch, with the cuspids acting as abutments, while the upper incisors, overlapping the lower, are drawn inward continually by the

FIG. 3.



action of the upper lip, and normally form their arch by resting against the outer edges of the lower incisors.

Hence we see in the great majority of cases that the regularity of the upper incisors, which is so apparent, is controlled by the posi-

tion of the lower incisors, which are generally scarcely visible ; so that if the lower incisors and cuspids are regular, the upper ones are sure to be if they close outside the lower. This is true whether the upper teeth stand closely enough together to touch one another or not.

This position is illustrated by the drawing of the jaws of a savage (Fig. 3), which I herewith present ; showing the upper incisors perfectly regular, notwithstanding the space existing between the lateral incisors and the cuspids.

Allow me, in closing, to recapitulate these six laws.

1st. The child continues to grow up to eighteen years of age, or the time for the development of the third molars.

2d. The crowns of permanent teeth are as large in circumference at six years of age as they ever will be, and they are packed away in their alveoli with regular irregularity, the central incisors lying in front of the laterals and the cuspids almost over them.

3d. The cuspids are the firmest and least movable of all the teeth in the mouth, so that all the other teeth incline toward them.

4th. The lower molars incline inward, the upper molars outward.

5th. Each class of lower teeth develops before the corresponding upper teeth, and thus guides, or ought to guide, the upper teeth into a right position.

6th. The lower incisors normally lean forward to form an arch with the cuspids, and so support the arch of upper incisors, which, closing outside of the lower ones, are constantly drawn toward them by the action of the lips.

Discussion.

Dr. E. S. Talbot said that where irregularities of the teeth were caused by the teeth being too large for the jaws, the reason of the smallness of the jaws could generally be ascribed to either (1) heredity, where the jaw seemed to be derived from one parent and the teeth from the other ; (2) a neurotic temperament in one or the other of the parents : the child inherits this neurotic condition, and because of the faulty nutrition consequent upon it, at the age of six or seven years the jaw ceases to grow. We all know that the brain does not increase in bulk much, if any, after this time, and in these cases the jaw ceases to grow at the same time. The third cause is constitutional disease in the child, such as scarlet or other fever : the interruption in nutrition caused by such sickness will cause the jaw-bones to cease growth.

In regard to the teeth standing inward, as shown in the illustration. This is because, while the lower jaw is developed normally, the development of the upper jaw was retarded by some cause, and the teeth as they came through were crowded out of line.

It is not true, as the paper says, that a man's growth is completed by the eighteenth year. Growth usually continues until the twenty-second, and frequently to the twenty-sixth or twenty-eighth, year, and, in exceptional cases, till as late as the thirty-sixth year.

He spoke of the regulating systems of Dr. Farrar, Dr. Patrick, and Dr. Angle, condemning them because they used the molar teeth as anchorage to move the cuspids back to fill up the space made by extracting the first molar. He said that the cuspid has such a long root and is so firmly fixed that the posterior teeth will move forward

instead of the cuspid backward. He described a case of a gentleman who was at the clinics in Chicago, at the Columbian Dental Congress, to have the cuspid and bicuspid implanted. Upon preparing for the operation the cuspid was found unerupted, and the implantation had to be abandoned. Subsequently an attempt had been made to move the anterior teeth, which were badly crowded and projected from their proper position, back to fill the vacant space and into their proper position. The molars were used as points of resistance, and the consequence of the force applied had been to move them quite inside the arch, so they did not touch the corresponding teeth in the lower jaw. This is an instance showing the futility of trying to move the cuspid by anchoring on the molars. The only sure way to accomplish the movement of these teeth is to use the back of the head for resistance.

Dr. William Carr asked Dr. Talbot if adenoid tumors, nasal polypi, and other growths which caused mouth-breathing were the cause of irregularities in the teeth.

Dr. Talbot answered that these diseases came together, but did not sustain the relation of cause and effect one to the other, except that anything which caused mouth-breathing by bringing about the habitually open mouth would, by destroying the effect of support by the lower teeth upon the upper, allow the upper teeth and the alveoli to grow down and the teeth to protrude.

Dr. M. H. Fletcher said that one fact is usually left out of discussions on the cause of irregularities of the teeth. That is, that bone will be absorbed by pressure of the tooth if force is applied to move it, thus removing the bone from in front of it, and that it will grow around it to hold it firm in its new position. From this it follows that in cases of overcrowded teeth, if they are treated in time, the shape and size of the jaw can be corrected by bringing pressure to bear upon the teeth.

Dr. Carr asked Dr. Talbot if mastication had an effect upon the development and shape of the jaw and the regularity of the teeth.

Dr. Talbot said yes; both the lower and upper jaw were developed by use and friction, and that if children were taught to masticate their food properly, the jaws would be better developed.

Dr. J. Taft asked Dr. Talbot if he had said that the jaws were fully grown at the age of six or seven years.

Dr. Talbot answered that he had said that in children who had inherited a neurotic temperament growth ceased at this age; not in the case of normally healthy children.

Dr. Taft spoke of the influence of properly masticating the food upon the growth of the jaws and the general health of the system. He insisted upon the great importance of teaching the parents of children the necessity of using the teeth. He said too much of the food given to children is prepared so as to give no exercise to the jaws, and that not only do irregularities and lessened development of the bones of the face occur in consequence of this, but the structure of the teeth is less dense than it would be if the children should use their teeth habitually in masticating hard substances. To teach people to use their teeth, and thus prevent irregularities, would be better service than to correct irregularities.

This lack of properly masticating the food is much more general

than is usually supposed, and should receive more attention. The teeth, as we know, do not all erupt at once, and if they are used those which are erupted will, by means of the shape of the cusps, bring the later ones into proper occlusion. This emphasizes the necessity of early teaching the facts in regard to masticating food properly.

Dr. S. B. Brown said that in his town, Fort Wayne, Ind., they had had a teacher who was so impressed with the fact that the jaws and teeth needed exercise to insure their well-being, that he advised the parents to have the children eat parched corn.

Dr. Taft said that it was easy to see how the proper use would increase the size and strength of both jaws and the teeth. The act of masticating caused pressure which would expel the blood from the capillaries acted upon, new blood would flow in, carrying new material which would enlarge and strengthen the parts. Thus the bones would be larger and stronger, the teeth more dense, and the gums firmer in structure and in their hold upon the teeth. He said that tobacco-chewers usually had gums which extended well down upon the teeth, of good color and healthy.

On account of the food they use, the jaws of aborigines are usually broad and strong, and the teeth large and good.

Dr. R. Finley Hunt spoke of a report made by Dr. Winder of the result of the examination of about one thousand crania of the Indians in the northwestern part of the United States. About one-fourth of these skulls had lower jaws; thus they contained in all about twenty thousand teeth. In all these there were less than fifty showing any trace of caries. In one cranium, belonging to a half-breed, however, there was decay in both upper and lower jaws. In his view the preservation of the teeth depended upon the preservation of the whole physical system. Civilization, by cultivation of the mind and brain, tends to expand the upper head and contract the lower part.

Disregard of the laws governing the development of the whole body was the cause of the lack of development of the jaws. At birth the maxillæ of a child are almost perfect semicircles; as the teeth erupt the jaws elongate. When there are twenty teeth the jaws are full; they extend clear back to the articulation of the jaw, and after this the jaw elongates enough to receive three more on each side of each jaw. The jaw is elongated, and alveolus is formed to contain the whole thirty-two teeth of the complete denture.

The constant pressure of the tongue upon the lower teeth tends to expand the lower jaw, and as these teeth are erupted first they have a controlling influence upon the upper teeth as they appear and regulate their position. All the muscles of the face which come into contact with the teeth tend to determine their position.

Discussion closed.

Dr. Finley read the following paper by Dr. Charles E. Francis, of New York:

HYGIENE OF THE MOUTH.

Perhaps no other branch of medicine can reach and benefit mankind to a greater extent than the department of dentistry. The health, comfort, and length of life of members of all communities depend greatly upon the condition of their organs of mastication. If neglected, decayed, and broken, they are unfit for the proper

comminution of food for nourishing the animal tissues. Imperfectly prepared pabulum forced into the stomach overtaxes and irritates this much-abused receptacle, deranging its function, causing indigestion and attendant evils to which so many are subjected. And, furthermore, when the teeth become diseased and painful, they wear heavily upon the nerve forces, cause loss of restful sleep, and unfit their unfortunate possessors for the duties of the day. They also taint the breath, corrupt oral secretions, impair speech, and often make life well-nigh miserable. And where the dental arches are contracted, the teeth irregular and crowded out of position, the face is bereft of its natural rounded contour, and the features become more or less distorted. The surfaces of the teeth being clouded with dark stains and loaded with offensive accumulations, are often a source of dire mortification to their possessors, and are unsightly and repulsive objects to whoever beholds them.

To allay pain occasioned by a diseased condition of the calcific organs within the oral cavity, and restore them as far as possible to a state of health and usefulness, is one of the chief duties of the dental surgeon. To remove such as are beyond the power of restoration and are a source of continued irritation, to insert artificial substitutes for filling vacant spaces caused by these removals, constitutes also a large share of the dentist's occupation.

But however earnest may be the efforts of the dentist to benefit his patients in the way of repairing, restoring, or otherwise treating broken or diseased dentures, and however satisfactory may appear the immediate results of his manipulations, he cannot be sure that his excellent skilled labor will withstand the encroachment of time, or his hopes for the durability of his operations be fully realized.

Diseases of the teeth and gums are, as a rule, due to habitual carelessness, or a neglect to give them such attention as they need. Everybody must or should know that decalcification of the tooth-structure is caused by a chemical action of acidulated accumulations remaining too long in contact with the teeth, and that diseases of the gums are, as a rule, occasioned by collections of food and salivary calculus which are permitted to gather about their cervical borders and fill the dental interstices. The mucous membrane, from this unwelcome intrusion, becomes irritated and naturally recedes. Collections of calculus follow and become attached to the denuded surfaces; the alveolar territory is invaded and absorption induced; and where any idiopathic tendency to socket-disease exists, this disagreeable malady is sure to be developed.

According to the old aphorism that "like causes produce like results," conditions with the buccal cavity which are productive of mischief, if allowed to continue or afterward exist, are almost certain to witness a reproduction of similar forms of mischief. If, then, our patients expect to be permanently benefited by operations on their teeth, it is essential that they do their part in efforts to make them lasting. As "prevention is better than cure," the theory of *prevention* is a matter worthy their earnest consideration. In order to secure good dentures, care is requisite at an early period of life. The deciduous teeth should be retained in the mouth and kept in a healthy condition until supplanted by their more durable successors, —extraction being resorted to only in cases of extreme necessity.

Premature loss of the deciduous teeth means not only a loss of their useful services, but in a measure it interrupts or checks the full or perfect development of the dental arches. The permanent teeth also need frequent examination during the period of their eruption, and to be kept free from stains or extraneous collections. Any suggestion of caries or decalcification should receive immediate attention, and all suspicious points be examined with the utmost care.

Finely pointed searching instruments and magnifying glasses are essential for this purpose, and waxed floss silk passed between the teeth will also aid in disclosing defects. Cases of irregularity should invariably be corrected, certainly as much so as possible, in order that well-formed arches and perfect articulations may be secured; for when in regular order the daily task of cleansing them is much less difficult.

It has been said that "cleanliness is next to godliness," and nowhere can this excellent law be observed to greater advantage than within the precincts of the oral cavity. Our patients should be made to understand the importance of giving due consideration to their organs of mastication, and instructions or advice on the part of the dentist impressively imparted. Our patients should also know the advantages they gain by having their teeth examined at frequent intervals, at least twice a year. I have reason to believe that many of our fraternity are remiss in this matter, and even where they give advice or warning, their words are not sufficiently emphatic or comprehensive to become effective. People should be taught the use of a tooth-brush and how to manipulate it to the best advantage, and the proper time for using it. They should also be instructed regarding the use of floss silk, tooth-picks, dentifrices, etc., and the benefits to be derived from frequent and thorough rinsings of the mouth with water. Antiseptic mouth-washes have also their benefits, especially where the gums are congested and receding from the teeth. The disgusting disease known as pyorrhea alveolaris may often be held in check, and perhaps prevented, if proper attention is given in way of keeping the teeth in good condition.

To the dentist who does all in his power to perfect his operations, it is certainly disheartening when at some subsequent period he discovers that his labors have availed but little. The best impacted fillings, if constantly menaced by agents of decalcification, are likely to become undermined and prove valueless. The dentist may cleanse the teeth of his patient with the greatest degree of thoroughness, treat diseased gums and alveolar borders until restored to health, and dismiss the patient with the feeling that the teeth of the latter are in perfect order; yet what material benefit may be expected if they are again permitted to become neglected and coated with vicious accumulations?

It is a lamentable fact that so many individuals are habitually and inexcusably careless in this respect. Comparatively few give them such attention as they need, and many give them little or no care whatever, and perhaps never visit a dentist until some unbearable pain drives them thither for relief. Even then some of them seem to entertain the idea that their half-ruined dentures can be made almost as perfect as ever, and so insured from giving annoyance for all future time without further call or trouble on their part.

So far as the dentist is concerned, he can never be too thorough in his examinations or in his operations of cleansing. Either are quite essential. Nor can the dentist be too particular in imparting hygienic instructions to his patients.

Anticipation, or timely attention, and prevention constitute strong points in securing the preservation of the natural teeth.

At the close of this paper the following foreign delegates were introduced to the section by the chairman: Dr. G. Vargas Paredas and Dr. Daniel Gutierrez, both of the United States of Colombia. He also introduced Dr. Florentin Aguilar, of Cadiz, Spain, who was a delegate to the World's Columbian Dental Congress.

Dr. Talbot read a paper entitled "History of Deformed Vaults," which will be found on page 1209 of the current number.

Discussion.

Dr. M. H. Fletcher said that he considered the work that Dr. Talbot was engaged in as not second in importance to that of any scientific man in the United States, and that it was a real factor in the elevation of the profession.

Dr. J. L. Williams was glad to have heard Dr. Talbot's paper, and thoroughly approved the scientifically correct basis upon which he built up his conclusions.

Dr. Florentin Aguilar said there was great medico-legal importance in the studies prosecuted by Dr. Talbot, and it would be necessary to determine whether a high vault was or was not indicative of disordered brain. He related a case which occurred some years since in Madrid. A priest who murdered the Bishop of Madrid, was saved from death by his lawyer proving him insane, and it was brought out at the trial that a very high vault was a proof or an indication of insanity.

Dr. Daniel Gutierrez said that he had examined the mouths of many of the civilized Indians in South America. He found they had usually flat roofs to their mouths and good teeth. Pyorrhea alveolaris is unknown among them, and very few of them become insane.

The discussion closed.

The following paper by Dr. Vida A. Latham, of Chicago, Ill., was read, but for want of time was not discussed:

DENTAL MEDICATION AND EXPERIMENTS, WITH CASES.

To-day we stand on the threshold of scientific investigation, more particularly in dental surgery and pathology than in any of the medical sciences. Until recently this department has had to stand behind its fellows,—shall we say, by reason of its low position in the minds of both the public and the medical profession? As yet, few of our dental schools teach the sciences of histology, pathology, and bacteriology as they should be taught, or even require their students to learn these subjects in the medical department. But does not the dental surgeon have to deal with these subjects in almost the same manner as the general surgeon? Can general and dental surgery be separated from each other at all when we consider the meaning of anatomy, sepsis, pathology, etc.? I think not, for who knows what is in store for him when he decides to

treat an abscessed tooth? Does he not have to consider histology, anatomy, and the relations of the tooth, the origin and condition of the tissues, the changes proceeding at the time, and the effects likely to be produced? Must he not also consider the dangers of sepsis, all its resultants, leading perhaps to deformity, loss of structure, and possibly of life? Under these conditions can we not urge that the students of to-day shall be more thoroughly taught if they intend to save and repair diseased organs? Does not the public understand the vast strides lately made in all scientific investigation, and demand such training?

How many of the students of this period realize the fact that medication is needed, and that he should not use one remedy in every case, simply because his training has been derived from some respected and eminent teacher who prefers creasote to cloves for all conditions, and is content with it? We see how difficult it is to know what remedy to use when we are not thoroughly acquainted with the physiology and histology, to say nothing of the pathology of an organ. In dental science the question comes, How can we obtain the necessary amount of dryness without coagulation *first* being produced? The common agents all more or less belong to this group, as, for example, alcohol, ether, heated air, chloroform, and many of the essential oils. This is a difficult question to answer, the best and only true way being constant drying with absorbent paper, wool, and spunk. A thorough washing of the tooth in sterilized cold or warm water, then choosing an agent suited for the case, either deodorant, disinfectant, antiseptic, or germicide, provided it does not coagulate, and so place a most formidable barrier to its own penetration by coagulating the albumin, as do carbolic acid, bichlorid of mercury, etc. These agents must not be used, but one that has such a mixing and diffusing power that it is able to penetrate to a considerable distance, and so permeate through all the substance likely to be dangerous, and at the same time not disturb or irritate the surrounding tissues in any degree sufficient to cause any molecular change, and so produce a pathological condition. Therefore, to be thorough we must learn what drug is capable of miscibility in water, saliva, or mucus,—in fact, what agent is readily diffusible through water, for in this locality we can hardly make an aqueous emulsion as we understand the term in pharmacy, agitation being impossible, the nearest approach being to saturate the cavity of the tooth with some essential oil not much if any heavier or lighter than water, which by application in such a degree will soon become almost, if not quite, a mixed solution on account of concentration, and so become a graded strength solution, exactly on the principle used in hardening material in graded strengths of alcohol. When we have done this it is clear we are approaching our object of having an antiseptic action which can be followed by a germicidal agent.

When we have succeeded in destroying the microbes in the tissues, then, and not till then, is the time to use agents which have stronger actions and coagulating properties; because at this point we can use coagulants most readily, they acting as embalmers and protecting the tissues from contact with the air and fluids of the mouth, safeguards against further inoculation of aërobic germs, and at the same time to prevent the origin and growth of anaërobic germs.

From this, then, we gather that the most critical time in treating is the withdrawal of water and the saturation by an antiseptic and germicidal non-coagulating agent. To find those remedies which are satisfactory is the present duty of experimenters in this line. Mechanical means, as capillary attraction, will do much to aid in the removal of water. No substance is of any value as an absorbent unless it can take up at least five centimeters in height of liquid, and so wood-wool, wood-cotton, and cellulose-cotton offer the greatest promise. Then thorough washing with listerine, peroxid of hydrogen, when the softened dentine can be cut away. Eucalyptus (Sander's) will mix with listerine, and gradually permeate the teeth. If we use some remedy which liberates oxygen, we find it penetrates the tubuli and acts as an antiseptic, as a deodorizer and bleaching agent. Then the tooth should be soaked thoroughly by a dressing of eucalyptus or some other non-coagulant and non-irritating oil, and the final cutting away of the dentine.

I find the best plan is to permeate the tooth-substance with some antiseptic oil for a few days, then to change the dressing and place a paste of aristol or iodol, in eucalyptus or other oil, over the dentine; then a plug of cotton, followed by a sandarac plug, and lastly a temporary stopping of gutta-percha or oxyphosphate. When this is removed, the tooth can be dried by using warm, not hot, air, then chloroform or ether, followed by eucalyptus, and then, if a stronger agent is desired, carbolic acid will answer nicely, provided it is used strong, if the cavity extends to any depth and the pulp is in danger of being reached. In superficial cavities, a 1 to 40 solution can be used, but it must always be borne in mind that the weaker the acid the more it will penetrate, and judgment must be used in all the cases. Bichlorid of mercury, if preferred, can be used in place of the carbolic acid, for they are both germicides and coagulants.

Another question of great importance is the testing of our coagulating albumin agents by using antiseptics and germicides to see if they are able to penetrate this coagulum, for if this is possible, we need not fear that we shall not be able to kill the majority of micro-organisms present in any cavity. We can permeate the tubuli everywhere,—yes, and even the pulp,—and so produce a thoroughly aseptic tooth. In cases where we have large cavities, for example in molars, where we wish to leave some softened dentine over the pulp in preference to exposing it, this will be one of the greatest gains in dental pathology, for sterilized dentine is unquestionably the best capping we can find, and if the agents used do not prove irritants to the delicate pulp, the danger may be considered as past.

In such cases as the above, I have had great encouragement by the leaving of a paste of aristol and eucalyptus over the softened dentine, and capping over it, with temporary filling on that. Aristol combined with stearate of zinc, iodol, or iodoform can be used in the same manner by those who prefer them, using as an adjunct any of the volatile or essential oils which may be suited to the case.

It must be remembered the oils vary considerably in their chemical action, some being more diffusible, others said to be more powerful germicides, though this property is doubtful among them in the true sense of the word. Others, on account of the tannin they possess, coagulate quickly; others are stimulants to a great degree, and even

become irritants and vesicants. Oil of turpentine and terpinol (of Merck) are hydrocarbons, but myrtol and cassia are more potent as antiseptics than the other oils, though they are more stimulating and irritating, and must be used with caution near the pulp, or irritation and inflammation is liable to be produced.

The oils are useful to mix with carbolic acid to diminish its escharotic power. They will also dissolve iodine compounds, hence their value in mixing with aristol, iodol, etc. They combine nicely with glycerin, and some can be formed into emulsions, as they have a very slight solubility in water. There is no danger of discoloration of a tooth when a volatile oil is sealed in a cavity, for they all absorb oxygen, and its power of bleaching is so well known as to need no comment, but the cavity must be thoroughly dried before introducing the oil. If we can dilute the fluids of the tooth, as the quantity is small, we can then use our coagulants with some degree of safety, for we can combine agents with diluted blood, albumin, etc., which will not produce quite such a heavy and impenetrable coagulum.

In teeth where the pulp has been freshly removed, immediate root-filling is not safe, as a general rule. In almost every case where surgical treatment has been required, we have a wound, from which we have exudate, and this is almost always inflammatory. This secretion is liable to form a coagulum, and as blood-serum is an excellent medium for bacterial growth, we must watch and treat it most carefully. If the pulp has just been removed, it is well to use some normal fluid, as salt solution, in preference to water, to wash out the root, as the exudate will be kept in a fresh state and not coagulated, and it can be more readily washed away and leave no deposit at the apex. When this is got rid of, soak with eucalyptus for a day, then treat with—

R—Eucalyptus (Sander's), 3 parts ;
Ol. cassia, 2 parts ;
Eugenol, 1 part. Mix.

Carbolic acid, cloves, or any other agent can be used in place of the cassia if desired, and it forms a safe and pleasant antiseptic. Then, after a day or two, or a week, the root can be dried thoroughly with chloroform, ether, or warm air, then bichlorid of mercury, provided it contains tartaric or citric acid, which not only keeps the solution, but aids somewhat against coagulation; or, if preferred, crystals of carbolic acid may be placed in the root and a hot probe passed down. The heat melts the acid and cauterizes at the same time. Then fill the root with gutta-percha dissolved in equal parts of eucalyptus and chloroform, the pulp-chamber with cement, and then finish with gold. Naphthol and naphthalin are excellent antiseptics, and are useful for pulpless teeth, as they do not become stained. As antiseptics they are very valuable where a dressing is required for exposed pulps, as is also the mixture given above. It is cheap, simple to use, deodorant, and induces a rapid growth of healthy granulations.

In microcidin, a compound of naphthol and sodium hydrate, we have a germicide and inhibitor of germ growth. It is ten times as powerful as boric acid. In a solution of $\frac{3}{1000}$, which is the strength for general use, it is a most excellent wash where there is a free discharge of pus, and produces no irritation of the mucous membrane.

It also prevents fluids, especially urine, from becoming putrescent for thirty-six hours. It has a great advantage by being very soluble in water, neither does it corrode instruments nor stain clothing or tissue. Iodin water is a most excellent antiseptic fluid for irrigation of suppurating wounds, as it is for fresh wounds; and as it is a normal fluid, its effect on the blood and pus is simply to keep them liquid. It is of especial value in dying pulps or suppurating teeth.

What do we mean by permanent antiseptic dressings of wounds, and what are their desired qualities? We mean a dressing applied immediately after an operation and left till the wound is healed. The qualities we should try to obtain are:

1. As perfect hemostasis as possible.
2. Absolute asepsis of the wound or part.
3. Perfect drainage.
4. Sanguineous oozing reduced to a minimum, rapid absorption of any liquid by the dressing, and especially if in deep cavities.
5. Antiseptic action to be exercised by the latter upon the liquids which impregnate them, and so preventing decomposition, fermentation, and putrefaction.
6. Coagulating agents must be avoided until the tissues are antiseptic, and then, and not till then, can such germicidal agents as carbolic acid or bichlorid of mercury be used.
7. The absorption, even in small quantities, must be watched, and especially in iodoform and mercury, from which both poisoning and irritation are liable to result.
8. Mechanical and chemical indifference (irritability) to the edges of the wound.

Aseptol (sulpho-carbo orthoxyphenyl-sulfurous acid) is a syrupy, rose-colored, volatile liquid, with a strong odor, and is non-irritant. It has the following good qualities, as proven by numerous experiments:

1. Aseptol readily dissolves in every proportion of water, alcohol, and glycerin.
2. It is more acid, but at the same time less caustic, than carbolic acid, and it directly combines with bases.
3. It is perfectly harmless.
4. Its antifermenting, antiputrid, and disinfectant properties are more energetic than those of carbolic and salicylic acids, and so it recommends itself as a substitute for carbolic acid, and is a valuable hygienic agent.
5. It can be combined readily with essential oils.

A mixture of carbolic acid 67 parts with resorcin 33 parts, to which 10 parts of water have been added, gives a liquid mixture which will remain so, and is soluble in all proportions with water, and its use as an efficient and convenient antiseptic preparation is readily seen. Sulphocarbolate is a useful agent for dental work, as it is readily soluble in distilled water or alcohol. A solution ten or fifteen per cent. destroys micro-organisms entirely, while a five per cent. solution only arrests their movements. Wool and dressings are readily impregnated with the salt, and in consequence of its trifling volatility the antiseptic power is retained for a long time. It is non-poisonous, non-irritant, does not produce local anesthesia or eruptions, even if applied to the mucous membrane. It is useful as a powder, and can be combined with other agents.

Some consternation was caused to members of the profession when Dr. W. D. Miller's paper on iodoform appeared in the DENTAL COSMOS. If these conclusions are true, why is the drug so much used in hospital and medical practice in spite of its disagreeable and dangerous qualities? Has not the preparation of the drug, its solutions and methods of application, a great deal to do with these bad results? I think if the preparations are made in a sterile way such trouble and misunderstandings would be obviated to a large extent. Iodoform is used in several ways:

1. In very fine powder.
2. Pencils either made with gelatin, which are elastic, cacao-butter, wax, etc., which are rigid, or pencils 5-10 grs. of the drug, are excellent, and can be made like the nerve-filling points.
3. Iodoform gauze (ten to fifty per cent. solution in ether), for wounds, drainage, etc.
4. As emulsions, iodoform (ten to fifty per cent.), glycerin, and water equal parts, and tragacanth 0.25 per cent., or with oil, for wounds of joints, abscesses, etc.
5. Iodoform 1.00, benzol 9.0, lanolin or vaselin 11.0, and oil eucalyptus, 2 minims, injected in lymphadenitis.

So far no trouble has occurred in the use of iodoform when sterilized. I use olive oil sterilized by boiling, or some of the essential oils. The iodoform is added after cooling the oil, ten per cent. by weight. The vessel in which the oil is received is previously sterilized by washing, and followed by sublimate solution, the bichlorid being washed out by ether or alcohol, the former being preferable. The best preparation of iodoform is that prepared by means of electrolytic action according to the method of Schering. The inflammatory reaction so often noticed is not seen after thorough sterilization. Even when used as an emulsion in tuberculosis, etc., the results are excellent. A useful antiseptic mixture is that recommended by C. Cavazzini, composed of iodoform 55 parts, salicylic acid 20 parts, subnitrate of bismuth 20 parts, camphor 5 parts, or I prefer to add an essential oil in place of the camphor, for then we get both the oil and camphor effect. For indolent granulations in sinuses it quickly stimulates them, and supuration rapidly disappears.

Iodoform, either pure or in strong solution, has a very striking effect upon the nerve endings. It is more powerful in this respect than carbolic acid. Its effects are more lasting, and it is of great value in suppurating pulps and where sensitiveness still exists through the odontoblast cells being irritated or dying after removal of pulps by arsenic or by nerve-extractors.

A drug which so far is fighting for its existence in the vast field of materia medica, and which is so closely allied to iodoform, is dermatol. As yet it is upheld and condemned by many in the profession, but in my hands it has shown itself worthy of considerable further trial. It was first discovered by Heintz and Liebrecht, who convinced themselves of its freedom from poisonous properties by experiments on animals. Doses up to forty-five grams, repeated for several days, proved entirely harmless to rabbits, while one and one-quarter drams *pro dosi* was given by stomach-tube to dogs and rabbits, and no toxic effects seen. As an antiseptic agent it prevents putrefaction, and also the development of bacteria when used as a 1.10 per cent. solution.

Poisoning by internal administration of bismuth salts has been very rarely seen, as they are not readily absorbed from the alimentary canal ; yet they can be absorbed from the surfaces of wounds, ulcers, and lead to severe poisoning, with symptoms similar to those of mercury. Thirty to forty-five grains of dermatol introduced into subcutaneous tissue-pockets in animals, and also when placed in contact with the peritoneum, produced no symptoms of illness, and no pathological phenomena were found after killing the animals. Experiments on human beings in surgical, medical, obstetrical, and gynecological cases showed it also to be harmless. The harmlessness of dermatol, in contrast to such bismuth salts as the subnitrate of salicylate, seems to be due to its insolubility and constancy.

Bacteriological experiments made under conditions as closely as possible similar to those which obtain in the living body, at a temperature of 37°, under exclusion of light and in the presence of moisture, after first sterilizing the dermatol by steam, and control experiments made, gave negative results, except where the drug was scattered in very thick layers over the inoculated areas. This effect is also seen when iodoform, iodol, or aristol are used in the same way. Dermatol is chemically a basic gallate of bismuth, is an exceedingly fine saffron-yellow powder, closely resembling iodoform, which is not hygroscopic nor shows any effect by the action of air, light, or heat, and in this manner is superior to all the above-named agents. It is tasteless and odorless, innocuous, in a high degree exsiccant, and promotive of granulation. The subgallate of bismuth will stand a temperature of 212° F. It is relatively insoluble, and has a fatal action upon bacteria when in immediate contact with the substance to be acted upon. Dermatol is rapidly absorbed, and aids healing by its drying influence on a wound, since by withholding from the bacteria the fluid which is essential to their growth, it brings about their destruction, and also by virtue of its kolyseptic action—viz, its restraining influence upon the development of bacteria—it is destined to take a permanent position among the drying antiseptics. It has these advantages :

1. It can be rubbed into gauze, then sterilized by heat or steam, without altering the chemical nature of the drug or destroying its properties.

2. It saves the unpleasant necessity of changing dressings so often, and is of especial value in freshly sewed bowel wounds, and in perineoplasty.

3. It protects the wound as no other remedy can, and enables the surgeon to remove sutures much earlier than where other applications are used.

4. Gauze impregnated with dermatol, and used as tampons, is of great value in treatment of vaginal catarrh.

5. Dermatol suppresses secretions, whilst iodoform increases them.

Glaesar thinks iodoform is better applied to putrid wounds and suppurating tracts than dermatol, the last being used only when the wound is already aseptic.

6. For diarrhœal affections, in typhoid, dysentery, phthisis, etc., it has no equal.

7. For burns from either fuming nitric acid, hot water, or fat, it is excellent when applied as a salve.

8. In diseases of children, as ten per cent., with vaselin or lanolin, on lint, gauze, etc. In otitis media as a powder blown in. In skin-diseases the drying properties are especially useful.

9. In surgery, strongly secreting wounds, ulcers, abscesses, etc.

Methods of Use.—As powder, through insufflator on gauze, dusting. As liquid and pastes, in emulsion of collodion, glycerin, essential oils. As ointment, with lanolin, wax, zinc oxid, paraffin.

10. Wounds always heal without local reaction, febrile symptoms, or suppuration, and by the absorbing power it abstracts the moisture, and so deteriorates the nutritive value of the tissues. In dental surgery dermatol gave excellent results in chronic alveolar abscesses, both with and without fistulous openings, suppurating pulps, inflammation of the gums, and pyorrhea alveolaris.

Case 1.—In one case, which will do for a type of all, I found the patient, a lady, age eighteen, had a large abscess on the buccal surface, extending over the second superior bicuspid and first superior molar of the left side. A large cavity in the coronal approximal distal side, which, after applying the rubber, I washed out with warm water, sterilized, and cut down and beveled the enamel-walls. Then drying the tooth as well as I could with bibulous paper, spunk, etc., I applied a pledget of wool with pure listerine (Lambette's), soaked the cavity, then cutting out the *débris* and softened dentine, I soon opened up the pulp-chamber and root, and then reached a quantity of greenish-yellow pus. This I washed out with listerine, and then cleansed with a rough probe, and a smooth one with bibulous paper on it in preference to wool. I then washed out with listerine in preference to peroxid of hydrogen, as an accumulation of free oxygen is not good unless a direct outlet is present. I then introduced eucalyptus, and left it in contact but loose, followed by a dry plug of wool, and then another dipped in sandarac varnish.

After removing the rubber, I opened the pus-sac freely, after first touching with carbolic acid to render painless and antiseptic, well washing out the sac with sterilized warm water, peroxid of hydrogen, and finally packing with gauze dipped in the mixture above given. The patient had allowed this condition to become chronic, and a good deal of chronic inflammatory tissue was present through continual cicatricial openings occurring. In the right superior first molar was a large cavity and three small abscess-sacs over the buccal surface, and a fistulous opening from the palatine root, also a long-standing case. This was treated in a similar manner, and the patient told to come the next day, when the canals were well cleansed, oil of cassia in the left bicuspid and eucalyptus in the right molar, the wound cleansed, and fresh gauze inserted.

Good results followed until about two weeks after, when an increased discharge showed in the left bicuspid, which seemed difficult to get rid of, as it was apical and the abscess was still well open. I then washed it thoroughly, and made a paste of eucalyptus with dermatol, and with fine nerve-probes, etc., forced up all I could and even through the apex, covered the paste, and put in a temporary gutta-percha filling, as the patient wished to go away for a while. After two weeks, on removing the stopping, I found considerable of the drug absorbed, what was left being a fine dry powder. This I wiped out thoroughly with eucalyptus on bibulous paper, and then dried

with chloroform and finally ether ; inserted dry cotton, plugged temporarily, and after a week, as no bad results showed, I filled the roots and crowned, and so far have had no further trouble. The right side gave much trouble, and as a final resort I used dermatol in it, with excellent results.

Case 2.—A young boy with a cut in the sole of the foot, which had been very badly neglected for two weeks ; pus present in great quantity, much odor and pain. The foot was carefully washed in sterilized water, the necrotic epidermis, etc., cut away, and the wound covered with dermatol in a thin layer. This improved the condition. At the next dressing the drug was dusted over in a large quantity, covered with oiled silk to prevent adherence of the dressing to the wounded surface, the whole bandaged, and, as the boy would not keep quiet, the case seemed likely to require some time to heal. But after a few days, and the dressing being left undisturbed, the result was most gratifying. Suppuration ceased, the remaining necrotic tissue was thrown off, under which the granulating surface was rapidly formed, and, without irritation, covered with epithelium.

In experiments with cultures of staphylococcus, the growth stopped on applying dermatol.

Bacteria (twelve different varieties) cultivated on agar-jelly. Three tubes were in each case inoculated, one of which, for control purposes, was left free from the agent ; over the surface of the second dermatol was very lightly scattered by a spray apparatus, while the third was thickly covered with dermatol. One species of staphylococcus showed the most flourishing growth after three days in the control-tube, while in both the others (where dermatol was scattered) not a trace of development could be discovered. On the fifth day the surface of the latter two was scratched with a needle, and fresh culture-media inoculated therewith : neither here did any growth occur.

Agar covered with indigo-carmin, adding one per cent. and two per cent. dermatol respectively in *A* and *B*, well mixing the liquid and pouring in cold Petri dishes. In *C*, no dermatol ; staphylococci introduced, and the whole placed in the incubator. In *C*, decoloration after three days, while in *A* the same stage was not reached in the dish till the tenth day ; in *B*, not till the fifteenth day. *Vibrio Finkleri*, *Vibrio cholerae Asiatica*, *bac. syphi. abdom.* showed difficult and limited growth under the influence of dermatol ; while with *M. tetragenus*, *bac. subtilis*, *anthracis*, the cultures remained quite sterile.

These few points show dermatol is likely to prove very advantageous in dentistry and medical work, but it requires a good deal more careful examination to prove its exact position. A fact to be remembered is that, for a drug to act antiseptically, it is not necessary that the dose employed be able to kill the microbe ; it is sufficient that such a dose enable the leucocytes to triumph over the germs in question. Often the same amount of, say, the mercuric salt diminishes the power of both kinds of bodies ; but it is important that the action exercised be such as to enable the leucocytes to conquer, as it were, the micro-organisms. The aim, as we all know, is rather asepsis than antisepsis, the prevention of germs from gaining access to wounds instead of attacking them only when they have gotten there. The more rapidly wounds and other lesions can be closed up and repaired, by so much

is the risk of bacterial infection reduced. Hence the demand for wound-healing agents in practical surgery and dentistry ; and, so long as we must use them, it behooves all who have these agents in active work to contribute their results from time to time, with carefully recorded cases for or against these agents, so that after a time many unreliable and needless drugs could be set aside.

The following paper by Dr. G. Frank Lydston, of Chicago, Ill., was presented, but for want of time was not discussed :

THE RELATION OF SYPHILIS TO DENTISTRY.

It is not my intention to endeavor to present this comprehensive subject in all of its bearings I will confine myself almost exclusively to generalities, but to such generalities as have a practical clinical bearing upon every-day dental practice. I will classify my subject as (1) the specific relation of syphilis to dentistry ; (2) the nutritional relation of syphilis to dentistry.

By the term specific I mean the relation of infectious secretion-bearing lesions about the mouth to dentistry. The second class embraces those disturbances of the teeth and jaws which are the result, not of the action of infectious syphilitic processes *in loco*, but of secondary nutritional aberrations incidental to the impression of syphilis directly upon the parts affected, and indirectly upon these parts through the medium of the nerves and vascular supply.

I. It has appeared to me that the average dentist is inclined to overlook the possibilities of danger of transmitting syphilis to a healthy person through the medium of dental instruments and manipulations. A clean instrument from the standpoint of the dentist is not always a clean instrument from the standpoint of the surgeon. There are many men who consider that the washing and wiping of instruments before and after manipulations about the mouth are all-sufficient to prevent the possibility of the conveyance of infection. I would at this juncture impress upon the dental profession the facts (1) that an apparently healthy mouth may contain the poison-bearing secretion of syphilis ; (2) that nothing short of the application of extreme heat, dry or moist, or the application of pure carbolic acid will make instruments surgically clean. It is by no means infrequent in my experience that syphilitic patients will submit themselves to dental manipulations without informing the dentist of their constitutional infection. In such patients, an innocent, so-called aphthous ulcer or "canker-sore," as they are very frequently termed by the laity and by a certain class of physicians, may be a poison-bearing syphilitic lesion. Operators who are brought in contact with the more aristocratic class of patients are rather loath to attribute lesions of the mucous membrane to syphilis, especially when such lesions resemble those innocent aphthous ulcers that frequently result from simple local irritation or from digestive disturbance. It is to be remembered, also, that a small mucous patch, syphilitic erosion or ulceration, or perhaps a small fissure, may exist at the bottom of some fold or reduplication of the mucous membrane and be overlooked, the mouth appearing, on a superficial examination, quite healthy. The poison-bearing lesion may appear and disappear very rapidly, yet the saliva and mucous secretions of the mouth may be none the less contam-

inated and remain so for some days after the complete disappearance of the lesion. It is by no means unusual for small syphilitic ulcerations to exist in the irregularities of the tonsils or folds of the fauces. A frequent location is between the pillars of the fauces, where only careful inspection can detect them. A superficial examination of the mouth and throat under such circumstances will disclose an apparently healthy oro-pharyngeal cavity. A small syphilitic ulcer or mucous patch may exist beneath the tongue or on the floor of the mouth where it is concealed from ordinary inspection. Mucous patches far back upon the base of the tongue are frequently overlooked.

From what has been said, it is evident that from the standpoint of the possibility of infection, no mouth should be considered free from suspicion, and only by such suspicion can the dentist protect himself from the danger of infection of innocent patients. Several cases have come under my observation in which, while it would be difficult to positively prove that infection resulted from dental manipulations, my conscientious opinion is that infection resulted in this manner. I would warn the dentist particularly against the innocent-looking fissures and erosions of the lips and tongue, which the patient usually fondly terms "cold-sores." A benign-appearing fissure at the angle of the mouth may contain the contagion of syphilis. Oftentimes the patient himself is unconscious of the existence of syphilis in his system, but this innocence on the part of the patient is no safeguard against the infection of healthy persons. A very frequent lesion seen in the mouths of syphilitic patients is a superficial thickening of the mucous membrane, producing the so-called "milk-spots." Here we have a pearly-gray infiltration of the mucous membrane with the syphilitic neoplasm, the secretion of which is highly infectious. I might remark that the secretions of the lesions of the mouth seen in secondary syphilis are the most infectious of all the manifold lesions of this disease, not even excepting a primary chancre. The frequency of this primary lesion of syphilis about the mouth is very much greater than is usually supposed. I have seen some thirty odd cases of this kind. I have seen several cases in which patients who presented themselves to me for diagnosis and treatment of primary syphilitic lesion of the tongue and lip have been, at the time of my inspection, under the care of a dentist. The inference as to the danger of infection of healthy patients is at once obvious.

The safeguard of the dentist is (1) to regard all lesions of the mucous membranes of the mouth, tongue, and throat as possible elements of danger of infection, no matter how innocent-looking the lesions may be; (2) to remember that the healthiest-appearing mouth may possibly contain in some obscure situation the poison-bearing syphilitic lesion; (3) that the secretions of lesions upon the mucous membrane in this location—certain tertiary lesions possibly excepted—invariably contain the contagium of syphilis in a highly active and virulent form; (4) nothing short of the application of prolonged dry or moist heat, or immersion in pure carbolic acid, can be depended upon to destroy this contagium.

II. Nutritional changes of the tissues which come within the immediate province of the dentist may be classified as (a) those due to hereditary, non-contagious syphilis; (b) those due to congenital, active, and contagious syphilis; (c) those due to the constitutional

influence of acquired active syphilis; (*d*) those due to acquired syphilis that is no longer active,—that is, certain tertiary forms of the disease; (*e*) those due to nutritional disturbances produced by the remedies used for the cure of the disease.

These varieties of nutritional disturbances require some special consideration. It is to be remembered that syphilis in the parent may manifest itself in the child in two ways. (1) In unequivocal syphilis; (2) in the form of what may be termed attenuated syphilis, which, properly speaking, is not syphilis at all, but comprises certain nutritional derangements incidental to a faulty constitution of the child, due to the impression of constitutional syphilis upon one or the other, or both, parents. This has generally been overlooked, inasmuch as the physician is prone to classify such conditions under the more or less indefinite term of struma or rickets.

Parrot was not so far from the mark when he attributed rickets to hereditary syphilis. He, however, was inclined to term rickets hereditary syphilis. As far as the relation of rickets to hereditary syphilis is concerned, I would say, briefly, that it consists merely of malnutrition incidental to a faulty constitution, which constitution is hereditary, and is due to malnutrition of the parents, due to the syphilitic impression. It is not syphilis at all, and is not susceptible to the same treatment as true hereditary or congenital syphilis, but should be treated essentially upon the same therapeutic principles as rickets due to other causes of nutritional aberration. The same influence which syphilis is capable of imparting to the child through heredity may give rise to a faulty conformation of the jaws and a low grade of vitality of the structures of the teeth themselves, as a consequence of which irregularity of development, maxillary deformities, and premature decay may result. There is nothing specific about this relation of syphilis to dental pathology. On the contrary, this relation is a general and nutritional one.

The impression has been made upon me, by the study of this subject, that the *rationale* of the causation of these internal disturbances in the child is (1) a tropho-neurotic disturbance in the parents; (2) the transmission of the tropho-neurotic aberration to the child.

a. The relation of tropho-neurotic disturbances to various manifestations of so-called hereditary syphilis are much more important than is generally believed. In fact, I have for some years held the opinion that many of the late lesions, and possibly some of the earlier ones, of acquired syphilis are due, not to the action of the specific virus *in loco*, but to nutritional perversions of a local character incidental to the impression of the syphilitic poison upon the sympathetic nervous system, the function of which is largely trophic.

b. The lesions due to congenital and active contagious syphilis are in no wise different in their relations in general practice from those of the acquired form of the disease. There is usually a clear history of the presence of the disease in the active form at an early period after birth, or perhaps at birth. Fortunately, by far the majority of cases of congenital syphilis die during the first year, and those who eventually do come under the care of the dentist present lesions due to nutritional aberration rather than specific and active lesions. There are cases reported of hereditary syphilis in which the osseous lesions, particularly about the maxillæ and other bones of the face, have come

at a very late period, but there is an element of doubt concerning a certain proportion of these, and in by far the majority of them previous lesions might have been detected had the cases been under careful and continuous observation.

c. Active syphilis in the acquired form may produce a great variety of lesions of the mouth, jaws, and throat; mucous patches, ulcers, fissures, caries, and necrosis being the chief lesions. These are all contagium-bearing, and the dentist cannot be too cautious in handling such patients.

d. Under this head are certain carious and necrotic processes of the jaws and palate incidental to the tropho-neurotic influence of active syphilis. These lesions are generally of a tertiary character,—*i.e.*, they belong, properly speaking, to the period of *sequelæ*. They are not supposed by many to be productive of contagium, although clinically they should always be regarded as possible contagium-bearing, inasmuch as it is impossible to tell positively at what time the active form merges into the period of *sequelæ*. They are always to be regarded, however, as septic. Necrosis of the palatal processes, nasal bones, and of greater or less areas of the superior and inferior maxillæ proper, are frequent. It is generally supposed that these lesions are due to the pressure of the syphilitic deposit. By some they are attributed to the corrosive or local destructive action of the syphilitic poison. I regard these views as incorrect. The entire palate may be destroyed without any pre-existing pain, swelling, or any local disturbance which would be consistent with the view of pressure-destruction of the bone. It will be found also that these lesions are limited by certain anatomical areas, supplied by certain nerve-filaments. The bone, under these circumstances, will be dissected out by the disease as cleanly as it could be done by the knife. A sufficient amount of cell-deposit or local inflammatory action, sufficient to produce complete destruction of one or both palatal processes of the superior maxilla, could rationally be expected to be productive of great pain, local swelling, and other manifestations of the local destructive process.

Per contra, very often the patient will present himself to us with a history of a small ulceration in the hard palate. The introduction of the probe will disclose, much to the patient's surprise, the presence of a sequestrum, involving, perhaps, the entire osseous tissues of the palate on one or both sides. I cannot explain this peculiar condition upon any other theory than the existence of a tropho-neurotic disturbance, which has so cut off the nutritional activity of the bone that death has resulted.

e. It must be remembered that mercury used in excess, or in special cases of idiosyncrasy, is likely to produce inflammation or ulceration of the mucous membranes, or carious or necrotic osseous processes that are in no wise different, clinically, from those produced by the disease *per se*. A fallacious notion exists in the mind of the laity,—and I was about to say of the medical profession as well,—that syphilis is a specific poison, for which the natural antidote is mercury.

As a corollary of this fallacious notion, it is supposed that the larger the amount of the antidote short of killing the patient, the sooner and more effectively the syphilis may be stamped out. As a result of this fallacious notion, much damage has been done. If the nutri-

tion of the patient be seriously impaired by mercury and iodid of potassium during the active stage of syphilis, it is a noticeable fact that as soon as the immediate effect of the remedies has passed away, the syphilitic processes, favored by the constitutional debility induced by the remedies, not only break out afresh, but with renewed vigor.

The section then adjourned.

NEW JERSEY STATE DENTAL SOCIETY.

EVENING SESSION—*Wednesday, July 19.*

(Concluded from page 1174.)

THE PRESIDENT. We will now listen to Dr. Ottolengui, of New York, on "Torsion of Teeth."

Dr. Rodrigues Ottolengui. Ever since I first entered upon the practice of dentistry, I have heard, ever and anon, the cry go up against the rapid regulation of teeth. "Move teeth slowly, and avoid the danger of destroying the vitality of a pulp," has been the warning. By some, and I believe by many, this danger to the pulp has been claimed to be greatest when torsion of a tooth is the movement attempted. It is this idea which I shall endeavor to disprove.

The death of a pulp is probably caused, when it occurs during regulation of teeth, by the production of a pericementitis in the vicinity of the foramen, which impairs the nutrient supply of the pulp, which in turn results in inflammation or pulpitis, followed by its death. The pericementitis is occasioned by a pressure in one direction, which causes an absorption of the impeding tissues more rapid than the progress of repair of the tissues from which the tooth is receding. The idea of rapidity, as affecting this result, can have but one connection with this process, and that is as it applies to the distance to which the tooth is moved. This is evident, for the shorter the distance through which the tooth is moved, the less can one logically complain of the rapidity with which it is accomplished. For example, a tooth is moved when a silk is pressed between two contiguous teeth, yet it would be folly to claim that to pass a silk rapidly would be more dangerous than to do it slowly. I cite so extreme a case to reduce the proposition to the ridiculous, the *reductio ad absurdum* method of mathematics.

Hence it follows that it is dangerous to move teeth rapidly only when they are to be moved a considerable distance. Before passing from this, I will say, parenthetically, that the foregoing is not the only way by which a tooth-pulp may be made to die during the regulation of teeth, but it is probably the explanation of devitalization resulting from the too rapid movement of teeth, which is the subject under consideration.

If it be true that the danger of rapid movement is in proportion to the amount of movement, I have but to show that in the act of torsion a tooth is but slightly moved, in order to support my theory that teeth may be twisted rapidly with little if any danger. And when it is remembered, as it should ever be, that any regulation of the teeth which covers a long period of time becomes a distinct

strain upon the nervous system of the child, one sees at a glance that, where it can be done in safety, the most rapid movement of teeth is the best and only method which should be adopted.

It is my intention to show you a typical example of the several conditions wherein torsion is required, and to point out the amount and direction of the movement. But first I will call your attention to my methods.

It is well known that to rotate a tooth in its socket, it is necessary, in some way, to produce a pressure which will act upon one corner in one direction, or else upon both corners in opposite directions. Numerous devices for this purpose have been employed.

My method is to band the teeth with gold, having one or more hooks upon the band, as may be required for the individual case. This band is made very easily. I use pure gold plate of 28 gauge. Having cut a strip as narrow as possible for my purpose, I bend it approximately to shape with the ends turned up at right angles. This loose open band is slipped over the tooth, and not carried much beyond the cutting-edge. The ends are then caught with the serrated beaks of a pair of pliers, and drawn tightly together, which produces a tight-fitting band, except that as the palatal surface of the central incisor is concave, the band will pass straight across that surface, leaving a space. Later, however, when the band is set with cement, and pressed farther up, so that it impinges upon the bulbous part of the tooth, it becomes more accurately adapted; the loose ends are united with a tiny bit of solder, and then turned down to form the hook. Where I need two hooks, I begin with two strips soldered together, and when the loose ends are united, I bend both extensions to form my two hooks. The bands are cemented to the teeth, and so are permanently fixed until the rotation is completed. With a central incisor banded in this fashion, if a rubber ligature be thrown over the hook at the anterior labial corner, carried backward and attached to some fixture within the mouth, the anterior corner of the tooth will be carried in. If, however, the ligature attached to the same hook be carried around the palatal side of the tooth, and outward around the posterior corner, to be attached to a fixture outside of the arch, the result will be a rotation which will carry the anterior corner inward and the posterior corner outward at the same time. A similar result obtains when the ligature is hooked on the posterior palatal hook, then carried around the labial surface and inward around the anterior corner, to be attached to a hook within the mouth. The selection of either of these methods would depend upon the class of fixture used,—that is, whether there be an external band or not. Next, the posterior corner alone may be affected, by carrying the ligature from the posterior palatal hook outward to a band, carrying the corner out by its action.

The cuspid is probably the most difficult tooth to twist, yet it can be accomplished. I make a gold cap for this tooth, upon which I have my hooks for attachment of rubbers. This cap, like the band for the centrals or laterals, is made at the chair, without recourse to dies or models. I cut my gold into a shape similar to an hour-glass. When doubled by bending across its shortest diameter, we already have an approximate cap. This is slipped over the tooth, and burnished to it, after which the open edges are soldered together.

An accurately fitting cap can be made in this manner in a few minutes without going to the laboratory. The hooks are formed of a round wire, the ends being pelted to form knobs, and then soldered across the cap. This allows all the variations of attachment of ligatures and direction of rotation described in connection with the incisors.

I pass now to the consideration of specific conditions. I may say that all forms of this irregularity may be classified as belonging to three groups. First, where the anterior corner alone must be moved; second, where the posterior corner only needs change; and third, where both corners are in abnormal position.

(Dr. Ottolengui further explained his method and appliances for regulating teeth, and illustrated, by means of movable diagrams, the gradual movement of the teeth in the operation of regulating. These explanatory remarks would be but imperfectly understood in the absence of the diagrams, and are therefore omitted.)

On motion of Dr. Meeker, the discussion of the subject of Dr. Ottolengui's remarks was postponed until to-morrow morning.

Adjourned to 10 o'clock to-morrow morning.

MORNING SESSION—*Thursday, July 20.*

The president, Dr. Oscar Adelberg, in the chair.

The special committee on advertised anesthetics reported as follows :

WHEREAS, The number of secret preparations flooding the profession and receiving the indorsement of dentists throughout the country is perhaps the most serious evil that at the present assails the practice of dentistry;

WHEREAS, The danger to health and even life by the use of powerful agents in the hands of inexperienced practitioners is so well known that silence on the part of organized bodies becomes a professional crime;

WHEREAS, The use of all secret preparations of whatever character is derogatory to the ethics of this profession, and subversive of that high character so essential to the maintenance of true professional life; therefore be it

Resolved, That the New Jersey State Dental Society places the seal of condemnation upon all therapeutic preparations or processes where the formulæ are unknown.

Resolved, That hereafter any member indorsing privately, by writing or by making use in practice of such preparations, will be considered as having violated the Code of Ethics of this organization.

HARVEY IREDELL, D.D.S.,	} <i>Committee.</i>
S. C. HAMILTON, D.D.S.,	
JOSEPH W. CURTISS, D.D.S.,	

Accepted. Carried unanimously.

Dr. Richards, of the Committee on Mechanical Appliances, exhibited Dr. C. M. Hitchcock's crown-driver; also his gutta-percha crown caps for the protection of sensitive dentine; these are slipped down over a bicuspid or molar and allowed to remain for a week or two. Also Dr. George W. Melotte's moistening-pad, for use on the engine; outside is linen, and inside is absorbent cotton.

The discussion of Dr. Ottolengui's address was next taken up.

Dr. Sanger. Mr. President, I rise not so much to discuss Dr. Ottolengui's paper, as to thank him in behalf of the State Dental Society for the very novel and interesting diagrammatic talk that he gave us. It is indeed novel and instructive, and we have learned through Dr. Ottolengui a new method of illustration in giving papers on the subject of the regulation of teeth, which will be valuable to all

essayists in the future. A child could have listened to his talk last night and understood everything clearly, because it was demonstrated as he went along, and the eye as well as the ear was instructed. We all know, as mechanics, the value of that kind of instruction. I personally enjoyed it very much, and I believe that I carry away with me a far more distinct recollection of the whole subject than would have been possible under the old method of illustration, and I want personally, as well as for the society, to thank Dr. Ottolengui, in the beginning of this discussion, for the method he has introduced.

Dr. C. N. Peirce. The presentation of the subject was certainly most admirable. I never listened with greater pleasure to a talk upon the correction of irregularities than I have to that of our friend last evening. I think the subject could not have been made plainer. Perhaps the essayist might have said a word further in regard to the rotary motion of the anterior teeth. Where the palato-labial diameter is greater than the lateral diameter, the rotation might be attended with danger of lifting the tooth from the socket, when one attempts to rotate rapidly; and I think a word of caution would have been appropriate in that respect. The appliances, which were beautifully illustrated, and which the doctor did not claim were new, are, I think, among the most simple and efficient that we have to correct irregularity; placing the wire on the outside of the arch, away from the inconvenience of the tongue, and avoiding irritation of the mucous membrane of the palatal surface. It is a method that has been very generally adopted, covering the molars and bicuspsids, and throwing a wire around on the outside of the arch for making attachments.

Another word of caution: It is very easy to rotate those teeth on paper, but young men, when they attempt to do it in the mouth, will have some little difficulty to contend with; the teeth will not be so easily turned as they were in the illustration. There are many things unforeseen. We may have little curvatures on the end of the root which may interfere with their movements, and all that must be taken into consideration. You must not anticipate accomplishing the work easily or in a very short time. The possibility is recognized, and the probabilities must also be considered.

Dr. W. G. A. Bonwill. Mr. President, there is no very great trouble in telling or in putting on paper a method of performing an operation, but without proper charts or illustrations it is not so easy to convey the ideas to the minds of others. Dr. Ottolengui has done it very nicely. I should take exception to one thing. He has evidently theorized a great deal, and I do not see that he has made anything less complex than it was before. There is a tendency of every one who attempts to do anything to make some change in the manner of doing it, and while he may perform the operation well enough in his way, there is nothing of value added to our knowledge of the matter, and the operation is likely to be made more complex. The gentleman talks nicely and writes nicely; but if I had done the same thing that he described, I should have done it with a simple piece of rubber; that is all. He has a wire outside and a wire inside, and four clasps. Every one knows how hard it is to adjust one clasp, let alone two or four. While those charts are beautiful for getting the idea into your mind, I should say he had theorized too much. One case I doubt if he ever saw. I would ask him to bring his apparatus.

I should not be convinced from what I see there. He seems to have been increasing rather than decreasing the amount of work required to be done to accomplish the object.

Dr. James Truman. One word in regard to the method of illustration, confirmatory of what has already been said. Probably there is no subject that I have listened to in our dental meetings that is more tiresome to me than that of irregularities, but I must say that I have been intensely interested by Dr. Ottolengui's presentation of it, and not only in the manner, but in the mode of illustration. As has been said by Dr. Sanger, it is a novel mode, and I feel that I have gained a great deal in the way of illustration from it; therefore I want to return my thanks to Dr. Ottolengui for that much.

If I understood him in one part of his remarks, he rather advocated the rapid movement of teeth; that is to say, he could not conceive that there was any real danger in moving them rapidly. I must take issue with that idea. I do not believe in the rapid movement of teeth. There must be naturally a destruction and rebuilding of tissue, and you must allow time for that. And, more than that, there is danger of strangulation of the pulp at the apex of the root. Notwithstanding his beautiful illustrations there, that the movement of the apex of the root was comparatively trifling, there is sufficient movement, in the majority of cases where the movement is rapid, to produce strangulation of the pulp. In after-years the pulp is found dead, and we wonder how it occurred. I think we have all seen cases of that kind of strangulation of the pulp, with infiltration of broken-down blood-corpuscles into the tubuli of the tooth, producing discoloration. I have seen it, and therefore I do not wish to let that part of the doctor's remarks pass without a word of caution.

Dr. Ottolengui. Dr. Peirce said very truly that when you come to apply these principles in the mouth they will be found very much more difficult than they are on paper. I said last night that the hardest tooth in the mouth to twist was, perhaps, the cuspid, but I declare I have seen some lateral incisors that seemed to be untwistable; not only because the lateral incisor departs frequently from the conical shape, but the whole crown will be almost cylindrical, and it seems almost impossible to get a rotary movement on it at all. In some such cases, I have compromised by making space enough to send it a little farther into the arch, so that by being left protruding it has been in better position. I think if those teeth offered less resistance, it is because there is a curvature in the root above, which is identical with the motion below.

Dr. Kingsley told me of a case where he tried for a number of weeks to twist a central incisor, and finally concluded he could not twist it with his appliances; so he gave the patient an anesthetic, and undertook to twist it with the forceps. He took hold of it, and as he twisted it, it came down out of the socket so much that when he gave it the proper pose it extended very considerably below its neighbors. I said to him, "What did you do?" He said, "I twisted it right straight back where I found it." When I call that to mind, it shows a lesson: that if the root of a tooth is curved, it begins to assume a screw-form, and if you twist it, it will unscrew and come out of its socket; and if there is that screw form, rapid movement would be very bad. Such a tooth must be twisted not so very slowly that it

will not rotate the screw, but slow enough to allow absorption and repair of the socket without the tooth being dropped. That is what I meant when I said I could not cover the whole subject. I have accomplished the object for which I came here, which was to present a method of illustration, not of rotation.

Dr. Bonwill says we all know how difficult it is to make a clasp,—he calls it a clasp. I don't know how quickly these gentlemen can make a clasp, but it is two or three hours' work for me to make one, and when you get it in the mouth it is another hour's work to make it fit there. These are not clasps that I speak of. They are hardly to be called crowns; they are bands; and being made of pure gold, they are as soft as lead. When I get an accurate impression, it is simply a question of cutting a pattern to the proper form and outline, wrapping it around the tooth, and soldering the two ends together. Yesterday morning, before coming to this meeting, I found, when I went to my office, that it was necessary to make two bands, figure-8 bands, for a patient then in the country. I had an accurate impression of the case in my office, and I made those bands, soldered and polished them, in an hour, and I will guarantee that they will go right into place, without any alteration, when put in the mouth. I mention that merely to show that it takes no great time to make these bands. I can make a fixture of that kind in two hours. Nearly all of these cases that I mention were children under sixteen years of age. When you get beyond that age, the more rapidly you move the teeth the more danger you get into. The younger the bones are, the less osseous substance there is in them, and the more soft tissue. If you drill into the process for an implantation in an old mouth, you will find considerable resistance. I have taken a trephine and put it into a gentleman's jaw, and brought it out with a core of bone that was perfectly solid. In younger mouths I have done the same thing, and there was no core whatever. The bones in those young people are just osseous enough to make a differentiation from soft tissue, and they heal and repair more readily than the bones of older persons. When I say rapid, in referring to these operations, I do not mean too rapid, but I mean not too slow. In one case of regulation that was shown to me, I said, "Yes, that is lovely, but how long did it take to do that?" I found that the impression was taken in February, and the final model was taken the next December. Gentlemen, that is too long to keep a patient. I did some similar cases during the same year in from two to four months. Why take eight or nine months? I do not mean to advise doing what I said I did in one case, twist a tooth in six days, for that would be a very hazardous operation. This case was done in seven weeks, without any serious irritation or trouble. To do it in four weeks was possible, but might be dangerous. I do not wish to be understood as saying do it as quickly as you can, but do it as quickly as you can with safety. What that word safety means you will have to use your brains to determine.

Subject passed.

Dr. J. Adams Bishop, of New York, read a paper entitled "Cleft Palate and Its Treatment."*

* This paper was read March 21, 1893, before the New York Odontological Society, and published in full in the *International Dental Journal* for June, 1893, p. 406.—ED. DENTAL COSMOS.

Dr. Ottolengui. Mr. Chairman and gentlemen, the last time that I heard this paper read I thought there were some inaccuracies in the historical part of it, but I was not sufficiently posted to risk saying anything in the discussion that followed. I have posted myself since, and I am glad now to have heard the paper read for the second time, for I wish to take the opportunity to correct those inaccuracies. To any one who listened to that paper when it was read, it would seem to be more in the nature of a eulogy of Dr. Stearns than anything else. Dr. Stearns deserves all the praise that the multitude of dentists in the land have accorded him, but he does not deserve the credit given him in this paper. We are told that this instrument in my hand was constructed by Dr. Stearns at a certain time, the date of which was given, and then we are told substantially that Dr. Kingsley introduced a method, the only merit of which was that he took his impression in plaster of Paris instead of wax. That is taking away from Dr. Kingsley entirely the credit of introducing the rubber velum. What he introduced is not in any manner or shape similar to Dr. Stearns's original instrument; it proceeded on diametrically opposite principles to those used in all others. Dr. Kingsley told me, after I heard the paper before, that he knew about Dr. Stearns, knew about his instrument, saw the instrument he wore in and out of his mouth, and that there was absolutely no similarity between the instrument that Dr. Stearns wore prior to the time of his *vela* and this *velum*.

When I said there was a strong similarity between the instrument I have in my hand and Dr. Kingsley's, he said it must have been made after the introduction and description of his *velum*. Dr. Stearns had, I believe, some soft rubber, but soft rubber is simply a material; we might make a million forms out of soft rubber without encroaching upon each other's claims. The feature of Dr. Stearns's original instrument was that it was collapsible; that is to say, being soft, it is so arranged on the center line that it would collapse, and it was a very ingenious thing. But it had the trouble of complexity. It was not too complicated for Dr. Stearns's case, because he was making it for himself. Dr. Kingsley's instrument, on the other hand, remained stationary, having two flanges, such as we see here, of muslin, with a plate between, and it is that feature which is the original feature of Dr. Kingsley's instrument, and which he has told me I can say anywhere was absolutely new. That this instrument was made prior to that time is evidently an incorrect piece of historical information. I would further say on that subject something about how that instrument was originated. When Dr. Kingsley was in London showing his hard-rubber obturators, he went to bed one night and could not sleep, and as he could not sleep he began thinking on this subject. It then occurred to him that possibly an instrument of this character could be made; and with a pair of scissors and some cardboard and muslin, he cut out and constructed a little model, which model is at present in his cabinet at home; and that is the origin of the instrument he has been using for thirty years since. It was in no manner or shape an imitation of anything else, and the claim that this thing was made prior to that is a mistake. I do not mean to say it is intentionally so, but I call attention to it now, as it has been repeated to-day.

I would like to know whether this identical instrument has been worn by Dr. Stearns, whether this rubber itself has been worn, because if it has it is a refutation of the statement that soft rubber is so easily destroyed; it is in very good condition now. I believe you are told in the paper that a soft-rubber velum is useless after one month. To that I have only to say that there are fifty patients using them for three years, and one has worn a velum for ten years; so it is not true that a velum has to be replaced every few months.

About the most curious thing in this last paper is the statement that he would not advise using these instruments in mouths of children, because children do not appreciate what is done for them, and you cannot accomplish anything. When the paper was read before the Odontological Society, I showed some models of cases of children between the ages of five and eight years whose speech has been made absolutely correct, much more than is possible with older children. If you put an instrument in a child's mouth to enable it to begin to speak correctly, you have gained five or ten years that would have been given to learning a bad habit of imperfect speech. In the last five years we have put a number of these instruments in the mouths of children under eight years of age, and with a single exception they are all successful; and in that one exceptional case the child is so nervous that it is almost impossible to get it to wear anything at all.

Another thing is the claim that I see made here and there about this instrument,—that it has done such wonders in this mouth. That carries an impression which is erroneous, an impression that the instrument is applicable to any mouth. It is true that there are patients who, if you put in almost anything that will cover the cleft, will in time be able to speak well; but that is not a general principle,—you cannot apply that to every case. I know some cleft-palate people who do not use any instrument at all, and yet speak well. It is one of those marvels that I cannot explain. Make for one of those patients an instrument of hard rubber that is constructed in a few minutes, and you have a wonderful success; but you had a success before you started. But take one of these patients who cannot speak so that you can understand him at all, and give him an instrument that is not made all of rubber, that has a piece of metal substance over the roof of the mouth, a properly constructed obturator or velum, and you will find there is a great deal more science necessary to correct that person's speech than we have been led to believe by the simple and easy method advocated here.

Dr. James Truman. What year was it that Dr. Kingsley introduced his velum obturator?

Dr. Ottolengui. I cannot give the date.

Dr. James Truman. It is a matter of information that his velum has oftentimes been up before the profession, and I think it would be well to have the matter settled some time, as a matter of history. I remember very well, when Dr. Kingsley came out and visited Philadelphia, and described his vels and appliances and models, that I had read a full description, Dr. Stearns's description, precisely similar, a long time before. My colleague, Professor Wildman, at the same time called my attention to that fact.

As I understand Dr. Kingsley, he does not claim in his work the

origin of the process of molding and making vela, but it is simply an arrangement that Dr. Ottolengui has described. It is of course unprofitable to discuss a matter of this kind when we have no data at hand, but I think the matter ought to be settled. Dr. Stearns deserves all the credit, I think, that is given him in the paper.

Dr. Bishop. I have known Dr. Stearns for twenty years. I got this instrument from Dr. Stearns. I have given you the facts, and I have given you the dates as I have them. If you look at the history of our profession in 1876, you will find nothing there about this. Why should it not have been there at that time? That would have been the place for it. I think that a hard-rubber palate is equal to anything that we can place in the mouth. Perhaps some very small apertures would be better with soft vela; but from my experience, and what I have seen of the history of these cases, I think I prefer a hard velum. During the last few years of Dr. Stearns's life he was a paralytic; he could not make those instruments, but he made these little delicate strips. He came to my office and devoted the morning to it, and he was delighted to make them; he made them as long as life would allow him to. When these little pieces gave out, they were replaced. When I commenced with Dr. Stearns, he had half a dozen teeth in his mouth; they disappeared, and he finally had to resort to a full denture. I asked him for this one, and it was given to me. That velum was worn in his mouth. He had always two or three; he never wore one continuously, but wore them alternately, keeping the others in water. I appreciate what has been done all along the line by these men.

On motion, the paper was passed, with thanks to the essayist.

Dr. G. Carleton Brown, of the Committee on Materia Medica, proposed for discussion the subject of Pyrozone.

Dr. Ottolengui. Before discussing pyrozone, I desire to speak about trichloracetic acid. I bought a lot of trichloracetic acid because a gentleman whose opinions I value and whose principles I respect stated that if you dipped a stick in trichloracetic acid and rubbed it into a pyorrhea pocket, you will see an amount of mud and filth come down that will astonish you. Now, that is a specimen of conscientious incorrect information. I have been experimenting, and I find that trichloracetic acid, even the saturated solution, will not remove tartar from a tooth, nor will it remove serusal deposits from the apex of the tooth. I had a case where I had not cured the pyorrhea, but had kept the teeth in the mouth for two years, with tolerable comfort and considerable expense to the patient, and a feeling of dissatisfaction on my part. Finally he came in to have the tooth radically cured, either by some new method that I might know, or else by the forceps. I said I would try trichloracetic acid. I used a ten per cent. solution, then a twenty per cent. solution, and finally I used a saturated solution. After using it in these pockets, I would see all this mud come out that they speak of, but never a flake, never a bit of calculus. I began to wonder what this mud was that was so bad, and I eventually extracted the tooth. The pockets were only on the anterior side of the anterior root; the posterior root had no pocket. When I removed the tooth, I was amazed to see the size of the abscess which lay between the roots; the entire septum of the alveolus had been destroyed, and had given place to this growth of abscessed

tissue, and not one atom of it had been destroyed by the trichloroacetic acid, because the pocket did not lead to it, or if it did, it did not do it any good. I found the root literally covered with serumal nodules. I scraped that tooth in my fingers for twenty minutes with the saturated solution of trichloroacetic acid, and with the exception that it did eat up some of the abscessed tissue it seemed to have no effect; not a bit of calculus was removed. I might have put it in the solution for twenty-four hours, but as we cannot take the teeth in the mouth and put them in the solution for twenty-four hours, it seemed unnecessary. I opened the tooth, and found that the pulp was alive, although this abscess was in the socket. Now, then, where did this reported mud come from? I think I can tell you; but I will first show you another thing that you can do with trichloroacetic acid, and that is to reach an abscess through the fistula. In the first case that I had to treat I took a tiny crystal and placed it directly in the fistula, left it a moment, and then began pumping into the fistula with a stick. It destroyed a certain amount of tissue. I placed another crystal in the fistula and destroyed some more tissue, then another; and by about four applications I had burrowed a hole in the gum so that the end of the root was readily accessible. There was no hemorrhage, but any quantity of this mud. And I may tell you now that this mud is nothing but destroyed soft tissue, blood, and serum. When you see this mass of black stuff come out, you may be doing some good by getting the surrounding soft tissue into a more healthy condition, but do not flatter yourself that you are dissolving calculus. In about five minutes I had exposed the end of the root sufficiently to be able to scrape it with a spoon excavator, and I got the end of the root as clean by that method as I could with a bur, and certainly with very much less pain. The tooth was simply left to itself after that. The tissues healed nicely, and it is as successful a cure of abscess as I have ever seen. So I think trichloroacetic acid is of value in such cases. It is also valuable for removing a bit of gum overlapping a third molar. Instead of cutting the gum away, it can be burned away with a little trichloroacetic acid, without hemorrhage or subsequent soreness.

Now a word about pyrozone. There is one thing that I may say of pyrozone which is in contradiction of what I have written about it. I was very much surprised to see an article of mine in the May Cosmos, because I did not write it for the Cosmos. A gentleman from McKesson & Robbins came to me and asked me some questions about it, and then asked me if I would be willing to write it out for the foreign journals. I said yes, and I did so; and the next thing I knew I saw it in the Cosmos. In making some experiments with pyrozone, I got some of it on my fingers, and I stated that although it whitened them, it apparently did not destroy the cuticle. That was an error, for after I had written the paper, and it had gone from my hands, I noticed that my fingers began to have a scabby appearance, a very disreputable look, and all of that cuticle eventually died and came away in scales. And I was wrong in saying it was not painful. If there are any little breaks in the cuticle, and you get a drop of pyrozone in them, it is almost the same as a shock of electricity by a galvanic battery. It is a good thing to keep off of your fingers when you handle it. I am speaking of caustic pyrozone, and it is also true of antiseptic pyrozone. Antiseptic pyrozone and caustic pyrozone

are the same thing, except that one is a five per cent. solution and the other a twenty-five per cent. Medical pyrozone is a three per cent. solution, the antiseptic five per cent., and the caustic twenty-five per cent. That medicine is more useful as a cleanser and discoverer of pus than it is as a curative agent. It does not absolutely cure. After all, you have to depend upon nature to cure some things, and it is not in the nature of some people to heal up. There are constitutional conditions back of pyorrhea that are the cause of the pyorrhea, and you can only cure such cases for a few days. There is another good use for pyrozone. I have in several cases placed it into what we call blind abscesses, and then I have seen pus discharged through the root. I suppose the pyrozone has an affinity for pus. After putting it into a root, I have been surprised to see the amount of pus that would come out. It seems to be a very good thing to use in some roots, not in all.

Dr. Meeker. Mr. President, I have had some success in the use of pyrozone in bleaching teeth. I think it is a most wonderful agent for that purpose. I have probably used fifteen bottles of it, one-half of the antiseptic and one-half of the three per cent. solution. I have it with me all the time. I have used it in pyorrhea, and while, as Dr. Ottolengui says, it does not cure the pyorrhea, it eats up the accumulation of pus under the necks of the teeth, and in that way helps you to get the pockets perfectly clean. You can then go on with other remedies, and if the patient is cleanly in habits, you have some measure of success. I have had seven or eight cases in which I have used it with gratifying success to myself and to the patients. I would not wish to be without a bottle of pyrozone in my office. In abscesses, I use it with glycozone. I do not suppose there is very much of peroxid of hydrogen in glycozone, because after you open a bottle it does not last any length of time. When you first open a glycozone bottle, you can see that there is peroxid of hydrogen in it, but after it has been opened a little time it will deteriorate. Glycozone is pure glycerin and peroxid of hydrogen. I take a drachm graduate and pour into it twenty drops of glycozone, then put in the pyrozone; then take a piece of cotton on a probe, dip that in the mixture, and push it into the cavity, wait a minute or two until the effervescence ceases, and remove it. I cannot remember a case where I had no success. I am so well pleased with the action of pyrozone in bleaching teeth that, the other day, I undertook to fill a central incisor, build it down, and bleach it in two hours, but I was an hour and ten minutes in bleaching it. It looked well, and has not changed color since. I don't know when I have had a remedy that I like so much as pyrozone.

The President. What is your method of applying pyrozone for bleaching?

Dr. Meeker. I take a little gold probe that I hammered out, attach some bibulous paper to it, and dip it in the pyrozone, put it in the cavity, and twist it around for a minute or two. I use the caustic solution, and throw on a blast of air with an air-blower for the purpose of keeping up a rapid vaporization. I keep on in that way until the tooth becomes of the requisite whiteness.

Dr. Richards. Is the air-blast warm?

Dr. Meeker. No. It is merely for the purpose of vaporizing the ether in the pyrozone more rapidly.

Dr. Ottolengui. The doctor mentioned just now that he dipped

the bibulous paper, on a probe, into the pyrozone. I would not do that. Peroxid of hydrogen holds one atom of oxygen very loosely, and that atom is looking for something else to combine with it, and it is claimed that any vegetable matter put into it injures the quality of the material; and that if you dip cotton into a twenty-five per cent. solution, before it is half gone you will have a ten per cent. solution instead of a twenty-five. It is better to pour a drop on the cotton.

Dr. Meeker. I keep the bottle closed all the time; I pour a few drops into a drachm graduate when I want to use it.

Dr. Ottolengui. It makes a good spray. Often when you spray a set of teeth with it you will be surprised to see the amount of pus that will come around the sides of the teeth. When, after an exploration, you see a drop of pus around one tooth, spray the whole mouth, and you will probably find pus around many of the teeth.

Dr. G. Carleton Brown. There seems to be some difference of opinion regarding the percentages of the medicinal, the antiseptic, and the caustic solutions of pyrozone. The medicinal is three per cent., and that acts very much the same as the peroxid of hydrogen used in the same way; the antiseptic solution is five per cent., and the caustic is twenty-five per cent. I have a case in which I used peroxid of hydrogen originally, and then used pyrozone,—a severe case of abscess of antrum. I have had very good results, but not a complete cure. I have not dared to use the caustic solution in the antrum; I first used a three per cent. solution in the same way that I would use peroxid of hydrogen, then followed it with a five per cent. solution. The patient is affected with a severe neuralgia, and as soon as the pyrozone is applied, relief is instantaneous,—quicker than an electric shock. The effect lasts about a day. The evaporation of the ether produces some strangulation at first, but that passes away directly, and leaves the patient in a comfortable condition. The opening into the antrum is very small. The question is, Would it be safe to inject a twenty-five per cent. solution?

There is another preparation in the same line which I wish to call attention to; that is, sodium peroxid. It contains thirteen times as much bleaching oxygen as the peroxid of hydrogen; it is claimed to be the strongest, most powerful bleaching agent yet introduced, being ten times more powerful than pyrozone.

Dr. Meeker. Mr. President, I would say that I have used that agent to a small extent, and so has Dr. Beesley, and with both of us the caustic solution of pyrozone has given the best results in bleaching teeth.

Dr. G. Carleton Brown. Dr. Ottolengui spoke of an escharotic effect from the use of a five per cent. solution of pyrozone. I think you might get that effect from a twenty-five per cent. solution, but I do not get it from a five per cent. The day before yesterday I had my hands completely covered with a five per cent. solution. I was using a hypodermic syringe with a cork piston. It spurted all over my face and chin, but it did not make one particle of mark. Some got on my fingers and turned them white, but made no eschar. Was it owing to the fact that my hands were perspiring somewhat that it took hold of them and did not take hold of my face?

Dr. Barlow. In regard to syringes, I use one with a platinum

point ; I find it answers the purpose better than a regular hypodermic syringe.

On motion, the subject was passed.

Adjourned till 8 o'clock P.M. this day.

EVENING SESSION—*Thursday, July 20.*

President Adelberg in the chair. Report of clinic committee called for.

Dr. Sanger. We had a very good clinic this afternoon by Dr. Woolsey, of Elizabeth, with the electric mallet, filling with gold a superior first bicuspid, posterior approximal cavity, taking power from the Edison-Leland batteries, thereby demonstrating the efficiency of those batteries, and at the same time doing a very nice operation. Dr. N. T. Shields, of New York, gave a clinic on the treatment of difficult roots, demonstrating his method of root-filling with gold, although the case presented was not as difficult as he would have desired. Having treated the root, he filled it solidly to the apex with gold. A consulting clinic on irregularities was given, at which Dr. Rodrigues Ottolengui, Dr. James Truman, and Dr. C. N. Peirce assisted and gave their ideas. There were some clinical exhibits. The Edison Manufacturing Company showed a very ingenious electric head-light for making examinations in the mouth, and also demonstrated the efficiency of the Edison-Leland primary battery. Dr. Holbrook exhibited Moore's disk-holder, with a disk made especially for it. Dr. Stanbrough showed a very clever right-angle hand-piece, simple of construction, and very steady in action. The S. S. White Dental Manufacturing Company had a very fine exhibit.

In the absence of the author, Dr. Sanger read the following paper by Dr. George Evans, entitled,—

A METHOD IN ORTHODONTIA.

Any method of orthodontia which is effective in special cases and simple in character is worthy of our consideration. The method I here present I claim possesses these features:

In an examination of dental text-books and periodical literature I do not discover it mentioned. In an inquiry among professional acquaintances I have failed to find any who have practiced it.

The models shown will demonstrate the practical value of the method I present. They are of the mouth of a child of from seven to eight years of age, who is erupting the inferior incisors in a very irregular position. The lateral incisors are being erupted considerably inside the line they should properly take, and from the crowded condition of the teeth there is no likelihood of their being able to assume their correct position, even taking into consideration the progressing development of the jaw, especially as the other teeth will soon appear in order and require their proportion of space. The result is evident. Teeth erupting in this position seldom, if ever, assume a correct alignment with the others, unless space is acquired for them.

At a meeting of the First District Dental Society of New York, last November or December, I consulted with several gentlemen respecting this case. Various opinions were advanced, but the majority

recommended that nothing be done until the child was three or four years older ; then the jaw, in their opinion, could be expanded and the teeth forced to proper position. According to later writings on orthodontia, some would recommend immediate expansion of the jaw and correction of the irregularity. The disposition and present health of the child was not, in my opinion, favorable to this. The generally expressed opinion by our recognized authorities is, if practicable, secure for permanent teeth their correct position at the period of their eruption. I do not here wish to be understood as favoring extraction of the primary teeth. In cases of irregularity due to a crowded condition, I cannot say that I always favor expansion of the arch. I speak especially of this, as in most cases, such as the one referred to, expansion of the arch is by most practitioners recommended. In considering the subject, I inquire, Is the case, taking the relative size of each jaw and the dimensions of the teeth, one in which the arch is too small or the teeth proportionately too large? This is not alone to be determined by models of the case, but by an examination and consideration of the outline of the features. It is to be judged from an artistic standpoint. We have constantly before us cases in which the teeth are too small to properly fill a wide arch, and likewise those where the teeth are fairly proportioned, but the arch is exceedingly large. In this last-mentioned case we seldom hear of measures being adopted to contract the arches, except in cases of protrusion of the superior incisors. The case in hand, as exhibited by the models, is one which, in my opinion, does not, so far as the outlines of the features of the child are concerned, call for expansion of either the superior or inferior arches ; in fact, rather the contrary, so far as the superior is concerned. A study of the occlusion shows that an expansion of the inferior arch is hardly possible without proportionately expanding the superior arch. The manner in which the present irregularity of the inferior incisors was corrected is exhibited in the model, and was as follows : The mesial sides of the crowns of the primary cuspids were removed to the line of the roots at the cervix with disks, and in a few weeks, without appliances of any description, the irregular teeth as they continued their eruption moved to their proper position.

I will frankly acknowledge this method has only corrected the irregularity that recently existed. In the future I can more easily contend with difficulties that may be presented with the present erupted teeth in position. The method here presented I have practiced in many cases of irregularity of the teeth for a number of years.

There being no discussion of the paper, the subject was passed, and the society proceeded to the discussion of the selected topics announced in the program.

The first subject was, " Should immediate root-filling be practiced when purulent conditions exist at the apex?"

Dr. G. Carleton Brown. Mr. President, as the subject of root-filling has been very well discussed, I move that it be passed.

The President. The next subject is, " What are the best materials to enter into the composition of temporary fillings to be retained for a minimum of three years?"

Dr. Sanger. Mr. President, these subjects, as you are well aware,

are under consideration by various dental societies all over the country, having been put forth by the American Dental Association. We have already had a number of reliable opinions expressed on this subject, and to say anything upon it would seem like reiteration. The journals are full of these discussions, and as far as I have read them they seem to resolve themselves down to this statement, that a temporary filling to last a minimum of three years would pass beyond the class of temporary, and become in the nature of a permanent filling. That is dodging the question, in a measure. So the second deduction seems to be that gutta-percha, as a rule, is the one material which will fulfill all the conditions of a temporary filling as nearly as possible; and where the conditions are favorable it will last longer and save a tooth better than any other plastic filling. We eliminate amalgam from the question because that is not classed as a temporary filling-material. Of the various kinds of gutta-percha, the pink base-plate gutta-percha seems to meet our wants better than any other. Some gentlemen have advanced the idea that pink gutta-percha dissolved in chloroform and allowed to harden again makes a still tougher filling than the ordinary base-plate gutta-percha; why, I am unable to tell. It would be interesting to hear the various opinions of practitioners present here on this subject, for the benefit of all of us.

MORNING SESSION—*Friday, July 21.*

President Adelberg in the chair.

The President. Gentlemen, in continuation of the consideration of these subjects, commenced last night, we will proceed to discuss "The best method of obtunding sensibility of the dentine by either general or local means. Should arsenic ever be used?"

Dr. Sanger. I would start the discussion with a big NO to the last clause of the question. I think it would be wise for members of this society to put themselves on record in opposition to any method of obtunding dentine by the use of arsenic. This question was discussed at some length at a meeting of the Central Dental Association, and in spite of the very positive statements made at that meeting against the practice of using arsenic as an obtundent, some member went away, as afterward transpired in a personal conversation, with the idea that arsenic might properly be used as a local obtundent. Anybody who is familiar with the action of arsenic knows that it cannot be limited; and any remedy which is incapable of being limited in its action, and that is destructive of the tissues, should be kept away from the tissues, if temporary relief only is wanted. That is an obvious proposition, plain to everybody, and I only state it here to place this society, as far as I personally can, on the record in opposition to the use of arsenic as an obtundent. Arsenic is an escharotic, violent, penetrating, and its destructiveness to the tissues is familiar to every man here present. I trust that gentlemen will state their opinions, if only for the sake of record.

The President. If any other gentleman wishes to speak on this subject, we will be glad to hear him; if not, we shall consider you all as coinciding with the views of the last speaker, and we will proceed to the next question, "What are the best forms of partial lower dentures, and the methods for constructing the same?"

Dr. C. W. F. Holbrook. I hardly know how to describe the best forms for partial lower dentures. It is a matter of judgment for the dentist himself to decide; it depends a great deal on the particular case submitted. I use all the various forms known in dentistry,—bridges and plates,—and I do not think you can apply any one rule to constructing partial lower dentures. The field is broad, and there are a great many different appliances that can be used; one must use his judgment according to the case. I use gold in the majority of cases where it can be used.

The President. We will proceed to the next paragraph, "Corrective dentistry; its present status; what are the simplest and most universally applicable forms of apparatus and most efficient retaining-fixtures?" We have had a considerable discussion and demonstration of this subject since the opening of the meeting, but if any one else has a method or ideas to offer now we would like to hear from him.

On motion of Dr. Adams, the subject was passed.

After a vote of thanks to the proprietors of the *Asbury Park Journal*, The S. S. White Dental Manufacturing Company, the Edison Electric Company, and other exhibitors, the newly elected officers were installed, and the society adjourned, to again meet at Asbury Park in 1894. The officers for the ensuing year are: Dr. Edwin Maurice Beesley, president; Dr. C. F. W. Holbrook, vice-president; Dr. Charles Augustus Meeker, secretary; Dr. George C. Brown, treasurer.

NEW BRUNSWICK DENTAL SOCIETY.

THE fourth annual meeting of the New Brunswick Dental Society was held in St. John, N. B., on the 8th and 9th of August, 1893. The attendance was very good, and several features of interest to the profession were presented.

Essays on "Prophylactic Treatment of the Teeth" and "Artificial Dentures" were read by Drs. L. Somers, of Moncton, and C. A. Murray, of Moncton, respectively. Dr. Somers's paper called forth considerable discussion.

Dr. J. M. Magee gave a clinic on crown- and bridge-work, affording considerable information.

Incidents of office practice were related by several members, and the meeting was not only pleasant in the commingling of the fraternity of the province, but was profitable in regard to information obtained.

Dr. E. A. Smith, of Shediac, was elected president for the ensuing year, and Dr. W. H. Steeves, of St. John, secretary and treasurer.

The council of the above society also held its meeting on the above dates, and transacted its routine of business. The retiring members who had served their four years were replaced by Drs. James M. Magee, J. W. Sangster, and Frank A. Godsoe. Dr. C. A. Murray, of Moncton, was re-elected president, and Dr. Frank A. Godsoe, of St. John, secretary and registrar.

The next annual meeting of both society and council will be held in St. John, N. B., in August, 1894.

The dental examiners appointed for the year were Drs. J. M. Magee, C. A. Murray, and Mr. Cox.

FRANK A. GODSOE, D.D.S., *Secretary and Registrar.*

WOMAN'S DENTAL ASSOCIATION OF THE UNITED STATES.

THE regular monthly meeting of the Woman's Dental Association was held October 7, 1893, at 1300 Arch street, Philadelphia; President Mary H. Stilwell in the chair.

Professor C. N. Peirce read a paper, title "Diagnosis."

The next meeting will be held at the same place, November 4, 1893, at 1.30 P.M.

ELIZA VERKES, *Rec. Secretary*,
4004 Chestnut street, Philadelphia.

EDITORIAL.

WHY NOT PAY FOR IT?

RECENT issues of *The Lancet* contain several letters from gentlemen holding respectively the M.D., F.R.C.S., and L.D.S. degrees, in which are expressed their views upon the question of professional courtesy between medical men and dentists. The whole makes interesting, not to say amusing, reading, and at the same time furnishes food for thoughtful consideration. One correspondent, who signs himself M.D., M.R.C.S., writes to *The Lancet* as follows:

"I think that the rule as to fees between medical men and dentists is a very one-sided one,—that is to say, practitioners apparently rarely charge dentists for services rendered, whilst dentists almost invariably charge practitioners. I have never taken a fee from a dentist, and yet I have always been charged by dentists, even when the latter were personal friends. Dentists appear to charge medical men half fees,—that is to say, half a guinea for stopping a tooth, etc. I enclose the names of dentists whom I have consulted. You will see that all are qualified medical men. Personally, for obvious reasons I prefer to pay a fee. I am, sirs, yours faithfully, etc."

This brought out in the succeeding issue a communication from another medical man with a grievance, in which he says,—

"It is high time that some one called attention to our relations with dentists. . . . I think our liberality towards them is entirely misplaced courtesy. I once had a curious and appropriate experience in this connexion. I was once having my teeth stopped by a West End L.D.S. During one of my visits he recounted to me the great courtesy and liberality shown to him by one in the foremost ranks of our profession,—a baronet. This latter had during an illness given him gratuitous attendance. The L.D.S. gentleman *charged me half a guinea a tooth for stopping*. Dentistry is for the most part a mechanical craft, that should be carried out, when necessary, under the supervision of a medical man; and I am of the opinion that until dentists give up advertising and shop-window shows, no medical man should be allowed to practice as a dentist, nor should any dentist be recognized as a medical man."

Mr. Henry Sewill makes a dignified response to this latter communication, defending the professional spirit of qualified dentists as a

body, and states that "it is certainly not the rule for dentists to accept fees from medical men for professional services." The Gordian knot is editorially cut by the suggestion that dentists should charge only for the gold used in stopping the teeth of medical men. This small tempest in a teapot, it strikes us, is one of those outgrowths of an ancient custom which it would be well to dispense with and then readjust the matter in accordance with modern conditions. Is there any good reason why a medical man should not pay for his dental services, or is there any reason why the dentist should not pay for his medical attention? Is there any other basis upon which an equitable reciprocity can be maintained? In times long past, the medical man made no charge for his services; he was supposed to give his attention gratuitously, and received therefor such a reward in the shape of an honorarium as the gratitude and purse of the patient allowed. It was this ethical feature above all others that characterized him as a professional man and distinguished him from his commercial inferiors (?). To-day it is the universal custom for him to present a bill, or at least name a fee, for whatever of service he has rendered. Therefore, no matter in what light he may consider it, he has to that extent adopted the commercial method by placing a money-valuation upon his work. This has nothing whatever to do with the question of the actual value of his services, for in many instances they are not measurable in terms of money-value. It simply means that he rightfully expects compensation to the amount of his bill for his services. By the same line of argument a dentist expects to be remunerated for his services, and for the same reason. Now, there can be no doubt, unless it should so happen that the services mutually rendered by physician and dentist in a given case were practically equal in money-value, that dissatisfaction must in time surely arise on the part of the one who rendered the greatest amount of service. The simplest, and we believe the best, way out of the difficulty is for each party in the case to pay for the services of the other. We cannot agree with Mr. Sewill's statement that it is not customary for dentists to charge medical men. It is certainly not the rule in America, though it may be the custom to some extent. Inquiry among a number of prominent American practitioners of dentistry developed the fact that they treated medical practitioners the same as any other patients, and were so treated in return, an arrangement satisfactory to all concerned. Nor does it seem to be a universal rule among the dentists of England to make no charge to medical men for dental services,—unless the fee of "half a guinea a stopping" can be so classed. Perhaps if the complaining M.D., F.R.C.S., whose letter we quote, had been charged a fee more in harmony with the size of his personal and professional dignity, he would have found less ground for offense, and

not have assumed, because his dentist had upon a former occasion received gratuitous services from a medical man *cum* baronet, that he should "stop" the teeth of the entire medical profession of England free of charge in consequence.

If any exchange of courtesy is to be practiced in this connection, it should be limited to the dentist and his family physician. Anything beyond this is calculated to raise questions of equity with attendant unpleasantness which can all be avoided by the simple, soul-satisfying, and liberty-producing expedient of paying for what one gets. Under which conditions one can afford to be just as courteous as he wants to, and is not compelled to be more courteous than he ought to be.

BIBLIOGRAPHICAL.

ANÆSTHETICS AND THEIR ADMINISTRATION. A Manual for Medical and Dental Practitioners and Students. By FREDERIC W. HEWITT, M.A., M.D. Cantab., Anæsthetist and Instructor in Anæsthetics at the London Hospital; Anæsthetist and Lecturer on Anæsthetics at Charing Cross Hospital; Anæsthetist at the Dental Hospital of London and at the National Orthopædic Hospital. With illustrations. London, Charles Griffin and Company, Limited, Exeter street, Strand, 1893.

A work upon anæsthetics from such a well-recognized authority as Dr. Hewitt will be gladly welcomed by all who are from time to time called upon to make use of the anæsthetic procedure. The immense practical experience and profound scientific research of the author in the domain of anæsthesia at once entitles any expression of his views to careful study and consideration. The perusal of his book fully satisfies the reader that the author speaks whereof he knows, and every page bears evidence of careful, thoughtful study from the background of experience.

The general arrangement of the book is admirable. There are four main divisions, of which Part I treats of preliminary considerations, including the properties and impurities of the chief agents capable of producing anæsthesia, the general condition of the patient, the nature of the operation, procedure, or condition for which anæsthesia is desired, selection of the anæsthetic, and the method and preparations for the administration.

Part II deals with the administration of the selected anæsthetic, Part III the management and treatment of difficulties, accidents, and dangers of general anæsthesia, and Part IV the condition of the patient after administration. Perhaps the most interesting section of

the book from a dental point of view is that relating to nitrous oxid. Of this subject the author has made an extended study, both from the practical and theoretical sides. We were disappointed to find that he still advocates the use of the face-piece inhaler in nitrous-oxid administration. We have before expressed our objection to this kind of inhaler, for the reason that it obscures the lower part of the face, and especially the lips, thus depriving the operator of the most valuable index as to the progress of the narcosis, especially in its second and third stages. The study of the asphyxial concomitant in nitrous-oxid narcosis is especially valuable, and the author's work upon nitrous oxid in connection with air and oxygen respectively should be read and understood by all who use this anesthetic.

The author's understanding of ether as an anesthetic, and his views concerning it, are extremely interesting, and to our view correct. It is refreshing to find an English writer on this subject who is willing to admit the superior safety of ether over chloroform as an anesthetic, a fact which the recent appalling death-rate from chloroform in England should not have been necessary to establish. We know of no better practical work on anesthesia than the one under consideration, and heartily commend it to all interested in the subject.

OBITUARY.

DR. GEORGE W. MCELHANEY.

DIED, at Columbus, Ga., September 15, 1893, of paralysis, GEORGE W. MCELHANEY, D.D.S., in the fifty-first year of his age.

Dr. McElhaney was born at Eilerslie, Ga., August 13, 1843. His father died when he was quite young, and his mother married Dr. F. G. McElhaney, of Auburn, Ala., who raised him and taught him dentistry. In 1868 he went to West Point, Ga., and practiced until 1882, when he moved to Columbus, where he remained until his death.

Dr. McElhaney graduated in 1881 at the University of Tennessee, at Nashville. He was president of the Georgia State Dental Society; many years a member of the State Examining Board; represented the state in the National Board of Dental Examiners; was always an active member of the American Dental Association, and also of the Southern Dental Association. He left no children. He was an active Methodist, and, being in comfortable circumstances, delighted to entertain preachers. His home was known all over Georgia as "the preachers' resting-place." He was Eminent Grand Commander of the Knights Templar of Georgia.

He had been attending the meeting of the Columbian Dental Congress at Chicago; was on the finance committee, and took an active part in the proceedings; expressed great pleasure and delight at the results of the meeting. He seemed in perfect health, and was stricken almost in a moment.

PERISCOPE.

DR. C. R. BARHAM reports the following cases (St. Louis *Clinique*): A chancre of left tonsil was found in a fifty-three-year-old respectable negress who had been treated for follicular tonsillitis. Chancre of upper lip on a bartender who denied specific history; had cut lip on broken edge of beer-glass three weeks before appearance of sore. Examination showed papular eruption over body, which later appeared on face. Operation had been advised for epithelioma. Chancre of lower lip and a smaller one on chin of female. No history obtainable. Lower sore appeared after one on lip. Papular eruption was found on examination. Chancre of lower lip. A female, who was a room-mate of Case III, ate from the same dishes, etc. The sore appeared one week after first consultation of Case III. Diagnosis of fever sore made at first, which was changed one week later, when infiltration began to be apparent. Chancre of left side of neck on a female had been diagnosed as sarcoma of two months' duration. It was inflamed, etc., from previous treatment. Operation advised and agreed to. Examination the day before operation showed the macular eruption on chest. The following history was obtained: Patient was stung by an insect three weeks before the sore appeared; collar caused some irritation of wound. A woman placed a piece of adhesive plaster over wound after moistening it on her tongue. Chancre of upper lip on patient who had been nursing a child with sores on lip and in the mouth, which had hereditary syphilis. The child at the time had scarlatina. The child kissed her suddenly one day. Six weeks later the sore appeared on her lip. Mucous patches, headache, sore throat, etc., followed and confirmed first diagnosis. Chancre of upper lip. Sore appeared on lip about three weeks after burning it with a cigar. There is no specific history, but the patient was on a spree and drinking at several bar-rooms, wiping mouth on dirty hand-towels, etc. Burned mouth the same night. Diagnosis of epithelioma had been made by several physicians. Macular eruption present at time of consultation. Chancre of upper eyelid from a bite "while in a fight;" three weeks later sore became hard and infiltrated. Consulted Dr. Dean for double iritis. Secondary eruption on forehead and body present at time of consultation. The chancre had been poulticed for six weeks previous to consultation on the diagnosis of "blind boil," by a Hahnemannian. The duration of lesions was, on the average, two months previous to consultation. In five of the eight cases an erroneous diagnosis had been made; in three operation was considered to be indicated; and in one preparations had actually been made to that end. In the remaining two of the five the error did no further havoc than preventing the recognition of the character of the lesion at a later date, with the result of a bad case of double iritis in one case. In three cases a careful examination showed other symptoms of syphilis, or the history was suspicious and diagnosis was withheld a short time. In all these cases the difficulties of diagnosis were increased by applications to the lesion of a more or less irritating character before consultation.—*Med. Standard.*

OWNERSHIP OF FALSE TEETH.—A peculiar suit has been decided in St. Paul, Minn. In the case of Charles A. Vanduce *vs.* William J. Woolsey, it has been claimed that the sheriff could take possession of the plate to which false teeth were attached and dispose of the whole at public auction. But Judge Kelly has decided that a dentist has no lien on a set of teeth on a plate after they have been attached to the patient's mouth, as so long as the teeth are in the defendant's mouth they are part of his body and cannot be seized as chattels. The case has been before the courts for some time, and attracted widespread attention.

THE ESSENTIAL OF THE "NOSTRUM" is the secrecy of its parts or of its chemical character. In this secrecy lies the ever-present possibility of fraud and imposition, of endangerment of health and life, and the certainty of the moral and social degradation of the professions whose members countenance it.—*Amer. Medico-Surg. Bulletin.*

A WARNING CONCERNING THE CHLORID OF ETHYL.—In the London *Lancet* for November 5, 1892, Dr. H. Radcliffe Crocker calls attention to the fact that the vapor of chlorid of ethyl when inhaled is not altogether free from injury.

Having occasion to scarify a small patch of lupus erythematosus on the nose of a young lady, the writer thought it a favorable opportunity to try a chlorid of ethyl tube. The spot was frozen well enough, but the patient turned pale, slightly livid, and stopped breathing, looking very like a person under nitrous oxid gas. As the ethyl was at once taken away, she recovered in a few seconds, but Dr. Crocker states he will certainly not use it again to any part of the face where it is possible that the vapor can be inhaled. Chlorid of ethyl applied by means of a tampon is far safer and easier, but care must be taken not to overfreeze the skin, or a dermatitis may be set up.—*Therapeutic Gazette*.

REACTION OF NORMAL SWEAT.—Heuss (*Monatshefte für prakt. Derm.*, Bd. xiv, Nos. 9, 10, and 12) found the sweat of healthy men during rest to be normally acid, but when, after the administration of pilocarpin or boric acid baths, the sweat became profuse, the reaction was neutral or alkaline. The reaction of the sweat is to be distinguished from the acidity found in the skin as a tissue, which extends as far as the prickle-cell layer. Even when the sweat is alkaline the skin may be acid. The normal acidity of the sweat is the product of the less acid neutral, or even alkaline secretion of the sweat-glands and of the acid cutaneous fluid. Increase of alkalinity depends on the relative proportion of the sweat to the cutaneous fluid.—*American Journal of the Medical Sciences*.

HINTS, QUERIES, AND COMMENTS.

BOSTON, October 16, 1893.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—Allow me to call your attention to a misprint which is misleading in your October number. It occurs on page 1156, near the bottom, in Dr. Andrews's paper, where "filled" is printed four times instead of "filed." This, as you will perceive, totally alters the sense and states an untruth.

Yours truly,

THOS. H. CHANDLER.

[We regret the error which has occurred in connection with Dr. Andrews's paper, though it cannot in this case be called a misprint, inasmuch as the error occurs in the type-written copy furnished to us by the author.—ED. DENTAL COSMOS.]

TO THE EDITOR OF THE DENTAL COSMOS :

Sir.—Is there such a thing as a pus-forming or generating tissue? I see, occasionally, men of some prominence speaking of such.—B. H. C.

"THE whole business of nostrum producing and advertising for dentists is conceived in greed and brought forth in dishonesty. It is deception and trickery from beginning to end, and it is a great pity that so many dentists fail to comprehend the fact. If our laws were ideally perfect, the proprietors and vendors would be subject to arrest and wholesome fines."—GARRETT NEWKIRK, M.D.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—Last week I terminated a "great work" for a lady patient of mine, consisting of twenty-three gold fillings consuming three and two-eighths ounces

or twenty-six books of gold; the work was done with the automatic mallet, and non-cohesive "Globe" gold. I annealed the foil to such a degree of cohesiveness as the case demanded.

One of these fillings is a large contour filling on the first upper molar, right side, which consumed more than two and a half books of gold. This is the largest gold and the largest contour filling I ever made in a practice of ten years. The tooth was badly broken down; considered as a tooth, it is one of the largest first molars I have ever seen.

A few days afterward I was speaking to a fellow-practitioner of this large filling, and he showed me a number of the *Oesterreichisch Vierteljahrsschrift für Zahnheilkunde*, where a graduate of the Philadelphia Dental College, R. Antoine, M.D., makes the assertion that at a clinic Dr. W. G. A. Bonwill filled a *large mesial masticating cavity of a first molar, packing three-eighths of an ounce of gold in the tooth in only forty-five minutes.*

Now, I will ask the question, Is there any dentist in the United States, the high school for gold-fillers, who ever made a larger filling than two and a half books of gold as in my filling, or three books of gold, as Dr. Bonwill has done?—EMIL C. W. SANDRÉ, Vienna, Austria.

A REMARKABLE CASE OF REPLANTATION.—Seven years ago (in the autumn of 1886) Mr. A. L. S., of Philadelphia, went to one of the dental colleges of his city to have a tooth extracted. The demonstrator appointed a student to do the operation, while he himself stood in front of the patient to direct it. By an accident the forceps slipped forward, and instead of the lower left first molar, the second bicuspid came out. There was no other course open but to proceed once more and to extract the first molar complained of.

After this was done, the student took the bicuspid, and without any previous preparation whatever pressed it back into its socket by means of his thumb, and the demonstrator told the patient that the tooth might trouble him for a few days, and he ought to be careful in eating. The patient went home. The tooth caused some aching for a little, but after a week the soreness subsided, and to-day the bicuspid which had been accidentally extracted is just as firm in his jaw as any tooth can be, and does good service. This is striking, inasmuch as the replanted tooth had been neither held in position by ligatures, nor cleansed antiseptically, nor freed of its pulp. "It is ill arguing against the use of anything from its abuse," but this is a case where the abuse rather favors the operation of replantation, though many consider it hazardous.—HANS BLOCK.

SODIUM PEROXID.*—Some conflicting testimony has been developed with respect to the value of sodium peroxid as a bleaching agent for discolored teeth, the preference by some observers being given to the solutions of hydrogen dioxide for this purpose, especially to the ethereal pyrozone preparations. It is a fact that all of these preparations which depend for their activity upon their power to liberate nascent oxygen are in consequence oxidizers of organic matter, and therefore bleachers. But to successfully bleach a tooth is one

*A detailed description of this substance and its use as a bleaching agent for infected and discolored dentine was published in the *DENTAL COSMOS* for March, 1893.

problem, and to bleach it permanently is another. We may, by a bleaching agent, discharge the color of the organic matter in the tubuli; but if the organic matter is allowed to remain *in situ* it may undergo further decomposition, or so alter in process of time as to regain its color, and thus cause a return of the objectionable discoloration after a longer or shorter period. The only assurance we can have that a tooth once bleached will remain so, must be based upon the hope or knowledge that we have removed all of the organic contents of the tubuli, for as long as such remain they are a menace to the success of the operation. That sodium peroxid will accomplish the desired feature of removing the organic matter from the tubuli is reasonably certain. That no solution of hydrogen dioxid will do this is also reasonably certain. The final demonstration can of course only be made by means of the microscope, but until this has been done we have the following grounds for the statements as here made:

All the solutions of hydrogen dioxid so far examined in this respect are in varying degree coagulators of albumen. Samples of the more prominent makes of hydrogen dioxid, including the pyrozone preparations, were severally tested as to their coagulating power on fresh egg-albumen, and in each case a pronounced coagulating effect was observed, though varying somewhat with the different preparations. It is perhaps possible that the coagulation was wholly or in part due to free acid in the preparations, as they all showed the acid reaction with blue litmus, even the ethereal five per cent. pyrozone solution. The twenty-five per cent. or caustic pyrozone was not tested. To what extent the free acid invariably present in commercial preparations of hydrogen dioxid is a factor in their coagulating property will be further studied and reported upon; but be this as it may, the fact remains that as at present made and dispensed they are coagulants beyond doubt. The coagulating property of hydrogen-dioxid solutions is of extreme importance, when the relative availability and therapeutic value of these preparations for the treatment of infected and discolored dentine is considered in comparison with sodium peroxid for the same purpose. Sodium peroxid in solution is not only a non-coagulant of albumen, but it is a solvent of coagulated albumen. This fact was proven by the addition of fresh egg-albumen to a solution of sodium peroxid; the two were shaken together without producing the slightest cloudiness, the solution remaining permanently clear. Further, a considerable portion of cooked albumen was completely dissolved to a clear, soapy fluid in a few minutes, the resulting solution being soluble or miscible in water in all proportions.

The bearing of these facts upon the question of the utility of these preparations in the treatment of infected and discolored dentine is clear. Not only does sodium peroxid possess in an intensified degree the oxidizing property of hydrogen dioxid, but it possesses the additional feature of high solvent power for albumen, fats, oils, etc., as well as for shreds and fibers of tissue, dead or living. It is not only the best bleaching agent at our command, but for the reasons given it is unique in that it dissolves and removes the organic detritus of pulp-tissue in the pulp-chambers and tubuli. The appearance of a tooth properly bleached by sodium peroxid is markedly different from that of a tooth bleached by any other method, in the important respect that its normal translucency is restored. All other processes, even though they may discharge the color perfectly, leave the tooth-structure more or less opaque, so that the tooth presents a chalky appearance. This appearance may be

fairly charged to the presence of the whitened organic matter in the tubuli which the bleaching agent has failed to eliminate. Where sodium peroxid has been used, the case is quite different. Its solvent action upon the tubular contents has emptied the dentinal structure of its putrescent organic matter, and the appearance of the tooth is restored to normal translucency in consequence.

The perfect bleaching and detergent effect of sodium peroxid in these cases necessarily implies complete sterilization also. For this purpose we have no preparation which so fully meets the requirements for treatment of infected dentine. It can be used without regard to a previous use of oils, coagulants, etc., for its solvent, saponifying, detergent, and oxidizing properties fully meet these conditions, no matter what character of organic matter we may have to contend with in the pulp-chamber and dentine. The caustic alkaline property of sodium peroxid necessarily limits its applicability to treatment of pulpless teeth, and precludes its use in contact with the soft tissues of the mouth. It can be used in this connection by first exactly neutralizing it with an acid, but when this has been done we have simply a solution of hydrogen dioxid in connection with a sodium salt of the acid used. Active solutions of hydrogen dioxid can in this way be quickly extemporized when needed, but the standard preparations of hydrogen dioxid of known strength are more desirable. These have a range of usefulness beyond that of sodium peroxid. For example, the ethereal solutions of hydrogen dioxid known as pyrozone, antiseptic and caustic respectively, are extremely useful in at least two important particulars in operative dentistry, in addition to those well known and in common use.

First, in removing the discoloration resulting from leaky fillings, especially in the incisors. We frequently find the tooth-structure under such fillings non-carious, but stained to a considerable depth, and where it would be imprudent to remove it on account of possible damage to the pulp. To place a new-filling with the stained structure around it leaves the tooth practically unimproved so far as appearance is concerned, and the filling, no matter how skillfully done, still presents a suspiciously leaky appearance. If, after all carious structure is removed and the cavity is properly prepared for the reception of the filling, an application of ethereal pyrozone is made upon asbestos wool, and the solvent evaporated by the air-blast, the discoloration of the dentine will be removed in a few minutes, and the subsequent filling, if properly made, will measure up to the qualification demanded of Cæsar's wife. The treatment of all cavities by antiseptic pyrozone just previous to the insertion of a filling, whether they are discolored or not, is pursued by the writer as a routine practice for the sterilizing and detergent effect of the preparation upon the dentine.

Another useful application of hydrogen-dioxid solutions which has given much satisfaction is in the treatment of root-abutments for crown- or bridge-work. An application of ethereal pyrozone to the root and gum-margin, just before adjusting the crown or bridge, not only absolutely cleanses the parts from adherent mucus or blood-serum, but completely seals the surface of the marginal mucous membrane, so that there is no oozing or weeping of fluid from the membrane to interfere with the adhesion and setting of the cement. The pyrozone must of course be applied only to the gingival margin, but in such quantity to blanch the tissue to the extent of a narrow band around the root-end.—EDWARD C. KIRK.

HYPNOTISM AND ITS APPLICATION TO DENTISTRY.—My attention was first called to this subject, as a valuable aid in our profession, some years ago, while practicing as assistant in a Brooklyn office. An unruly child was brought to have a tooth extracted. As soon as he was placed in the chair he began struggling and crying furiously, but at my severe and persistent command to keep still the boy closed his eyes and allowed me to extract the offending tooth without a protest.

We had some difficulty in waking him up again. I was much puzzled over the case, as he did not present any of the symptoms of a fainting spell. I came to the conclusion that hypnotism had been the agent producing that condition in the child.

Experiments that I made confirmed my opinion, and further, that the person to be operated upon need not be aware that hypnotism is to be used to obtain the desired results.

The secret (?) of inducing hypnotism consists in suggestion pure and simple. We often see mesmerists go through the farce of making passes over the subject, and performing many other ridiculous practices. Some persons are very sensitive to suggestion, and these make the best subjects. Any one can practice hypnotism, whether his mind be stronger than that of the subject or not.

Hypnotism, like many other great discoveries, has a rough road to travel before it will be universally accepted as an aid in the practice of medicine. Ignorance is the great obstacle to its progress. Many otherwise intelligent men are opposed to it from the fact that *they don't believe in it*, not being able to give any other reason for their incredulity, as they have never thought it worth while to investigate this subject.

In my practice in this country, circumstances have obliged me to make use of hypnotism with great reserve, on account of the religious fanaticism that prevails. At one time it was noised about that I had made a pact with the Evil One, exchanging the welfare of my soul for the faculty of relieving pain in my dental operations!

I limit myself to suggestion, without mentioning anything about hypnotism, and am successful in the majority of cases in a more or less degree. Success depends a good deal on the amount of confidence the patient has in the operator. It is a well-known fact that the mere presence of the family physician subdues alarming symptoms in some cases before any step has been taken to relieve the patient of his malady. In fact, hypnotism and faith-cure are the same thing under two different names.

Now that Dr. Fillebrown has broken the ice with his able paper on "Hypnotic Suggestion as an Obtundent and Sedative," it would be well for all those who have had former experience with hypnotism, but who, like myself, have been shy to acknowledge its use, on account of the ignorant prejudice against it, to come forward and give the dental profession the benefit of their observations, that hypnotism may now take its proper place in the practice of dentistry.—FRANCIS ESCHAUZIER, San Luis Potosi, Mexico.

THE USE OF PARAFFIN AS A ROOT-FILLING.—For a number of years the writer has made use of paraffin, either alone or in connection with asbestos fiber, for a root-filling material in certain selected cases, with most satisfactory results. The material also furnishes an excellent vehicle for such antiseptic agents as are soluble in it. It is particularly applicable for the filling of tortuous and extremely small root-canals which are not accessible to solid fill-

ing-materials. The idea of its application in this regard was not original with the writer, but was picked up during the reading of some of the dental journals, and the name of the author as well as of the journal subsequently forgotten. In calling attention to the method and its value before dental meetings and elsewhere, it has always been a matter of regret that proper credit could not be given to the author, for the reason stated. The writer has quite recently discovered, and by mere accident in reading, that the use of paraffin as a root-filling was first proposed by Mr. Charles S. Tomes, whose original communication on the subject appears in the *Journal of the British Dental Association* for August 15, 1883, p. 370. As it so clearly states the value of this method and the reasons for its employment, the article is here quoted in full :

NOTES UPON A METHOD OF ROOT-FILLING.

BY CHARLES S. TOMES, M.A., F.R.S.

There are certain qualities which a perfect root-filling should possess, which cannot be said to be united in any one material in use for the purpose. It should be easy of insertion, for it often has to be introduced into narrow and tortuous channels ; at the same time it should be easy of removal, as it is quite impossible to secure uniform success with dead teeth, and intense suffering or the loss of the tooth may be the result of a root-filling which cannot be got out in the event of inflammation supervening ; gold or tin are neither easy to insert nor to remove. It must completely seal the pulp-chamber, so that fluids cannot enter from the apical foramen, and this wool or such things can never do. It should be of bland, non-irritating character, as with all care the escape of a little from the apical foramen may occur. For some years I have been in the habit of using occasionally, when I had pretty full confidence in the healthiness of the root, shellac drawn out into fine threads, introduced cold and packed and consolidated with hot nerve-canal instruments, but these fillings were very difficult to remove if the occasion arose. It has lately occurred to me that among the varieties of solid paraffin, such as is used for imbedding tissue for the purpose of cutting microscopical sections, a perfectly indifferent substance of any required melting-point could be found, and that if one which melts at but little above the temperature of that body be selected, it would be easy to introduce it in a fluid condition. If a hypodermic syringe be filled with such a paraffin, to which two or three drops of carbolic acid have been added, it will be found easy to introduce the nozzle of the syringe a little way up the root-canal, the syringe having been moderately heated ; when the piston is pressed, the liquid paraffin will of itself run a good way along the previously dried root. An excess having been left in the pulp-chamber and cavity of decay, a heated Donaldson's nerve-bristle worked up and down the canal will soon carry the paraffin to the very end of almost any root, and it can be kept fluid in the tooth either by touches of a hot instrument, or blowing at it with a hot-air syringe. The root may be filled entirely with paraffin, or filaments of wood, or even threads of cotton wool may be passed up into the melted paraffin ; probably the introduction of fine fibers of wood will be found to be an advantage in most cases, or fine wire may be substituted for the wood. So far, I have had every reason to be satisfied with the results. It is much less troublesome than any method of root-filling which I had previously practiced, for the first jet sent in by the syringe does so much toward the filling of any but the finest canals ; it seals the canals absolutely, so far as experiment out of the mouth can show ; in its introduction the risk of forcing decomposed products out at the end of a root by a piston-action is reduced to a minimum ; and it can easily be got out by warm instruments if the need arises.

Whether it will fulfill my expectations time alone will show ; there is but little novelty in the idea, but the method of employing some innocuous body of low melting-point with a hypodermic syringe may perhaps serve to diminish the tiresome nature of the operation of root-filling, so I have communicated this note on the subject.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER, 1893.

- September 5.—No. 504,475, to WILLIAM A. JOHNSTON and JOHN C. DAVIDSON. Pendent incandescent electric light.
- “ “ No. 504,487, to BENONI S. BROWN. Dental engine.
- “ “ No. 504,489, to CONSTANT DORIOT. Dental plugger.
- “ “ No. 504,490, to CONSTANT DORIOT. Dental engine.
- “ “ No. 504,091, to CONSTANT DORIOT. Dental engine.
- September 12.—No. 504,704, to STEPHEN H. BROOKS. Dental engine hand-piece.
- “ “ No. 504,828, to ALONZO B. ELMORR. Dental bracket.
- “ “ No. 504,912, to JOHN H. DEMONET. Dental mallet.
- September 19.—No. 505,121, to EDWARD NELSON. Dental disk-holder.
- September 26.—No. 505,490, to RUFUS G. STANBROUGH. Dental disk-holder.

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No. 12.

ORIGINAL COMMUNICATIONS.

CONTRIBUTIONS TO THE HISTOGENY AND HISTOLOGY OF BONY
AND DENTAL TISSUES.

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(Translated by R. HANITSCH, Ph.D., Demonstrator of Zoology, University College, Liverpool.)

(Concluded from page 1202.)

IF we compare Figs. 10 and 11, both of which represent sections through the root of a molar, we see at once that in old pulps a considerable number of pulp-cells have disappeared, while the pulp-fibers are more numerous. This is all the more remarkable if we consider that the lumen of an old pulp has become from three to ten times narrower than that of a young one. The missing pulp-cells, therefore, with their nuclei, have become changed into pulp-fibers. Sometimes we see in those fibers small, pale, spindle-shaped nuclei (Fig. 10), which are in the last stage of metamorphosis. I noticed the same thing in a hyperemic pulp (Fig. 12, S). Grawitz calls those metamorphosed cells "slumbering cells of the connective tissue." I can confirm the fact of their occurrence, but I do not believe that such reduced cells can, in cases of inflammation, be restored "ad integrum," as Grawitz thinks.

The phenomena observed when the young pulp is being changed into an old one are therefore plainly in favor of the view that entire cells can be changed into connective-tissue fibers. But still it is possible that a great number of the pulp-fibers represent a special kind of gelatin-forming fibers. This is V. v. Ebner's view, and, according to the advice of that authority, I made a number of experiments to settle this question.

It is well known that if connective tissue is boiled in a little water for several hours at a temperature of 100-120° C., all gelatin-yielding fibers are changed into gelatin, and the solution coagulates, when cooled down. If we employ a higher temperature than 120° C., then also a gelatin is formed, but it partially loses its power of coagulating.

I procured the jaws of a fresh-killed old cow, of a calf, and of a young pig. The teeth were broken open, the fresh pulps carefully removed and collected in a test-tube. After a few drops of water had been added, the ends of the tube were melted up. This is easily done without warming the contents of the tube to any appreciable extent.

In this manner I collected the pulps of all the milk-teeth of the calf, and of the permanent teeth, which were in various stages of development. In the pig, the permanent cuspids and the first molars were just on the point of breaking through. These pulps were specially collected, and also those of the still undeveloped premolars and second molars. In order to check the experiment, it was necessary to inclose also a few pieces of peridental connective tissue and of the mucous membrane of the jaws of the pig in a test-tube. The five

FIG. 12.

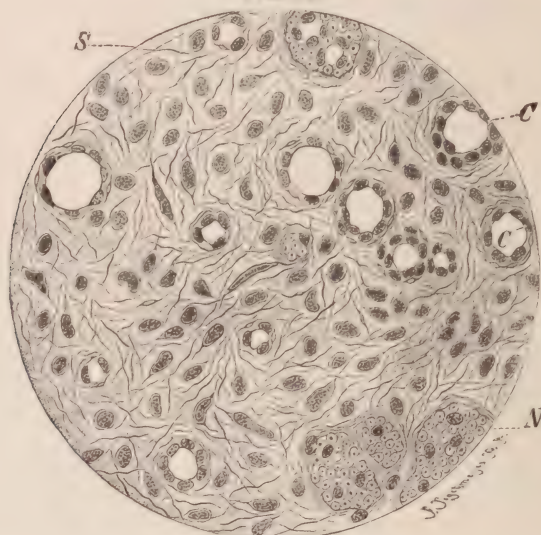


FIG. 12.—Hyperemic pulp of cuspid of man (twenty-three years). Ground section through the neck portion, according to v. Koch's petrifying method. *N*, nerve; *C*, capillaries; *S*, "slumbering cell." 300 diam. Drawn from a photomicro.

tubes were then wrapped in a cloth, tied up, and for two hours exposed to a temperature of 115° C. in a vulcanite boiler. After cooling down, the solution of the fifth tube, containing typical connective tissue of the pig, coagulated at once into a thick jelly. *The fluid obtained from the pulps of the cow did not coagulate, but assumed a somewhat thickish consistence; the solution in the three other tubes remained permanently thin fluid.* To remove all doubt, all the solutions were chemically examined. The director of the chemical laboratory of this university, Professor Baumann, was kind enough to undertake the investigation. After the dissolved albuminous matter had been precipitated with lead acetate, the solutions were tested for gelatin by three methods. A thick precipitate is formed at once when phospho-tungstic acid, or mercuric iodid and potassic iodid, or a ten per cent. tannin solution, is added to a slightly acidulated solution of gelatin. But such a precipitate could not be obtained by any of the

three methods, either in the solution of calf pulps or pig pulps; only with cow pulps, a *slight* precipitate was formed, which shows the presence of a *small* amount of gelatin. This small amount of gelatin comes, no doubt, from the true gelatin-yielding bundles of connective tissue, which in the fully-developed pulps run in the neighborhood of the nerves and vessels. I did not succeed in collecting teeth of man and dog in sufficient number. But as the structure of the pulp of the cow, although constantly growing, is quite similar to that of the fully-developed human pulp, the examination of human pulps would probably give no different result.

My investigations prove satisfactorily that the chief mass of the pulp-fibers do not represent gelatin-yielding fibrils, but unchanged protoplasmic processes of cells. The gelatin-yielding substance is absent altogether in young and undeveloped pulps. It is sparingly

FIG. 13.

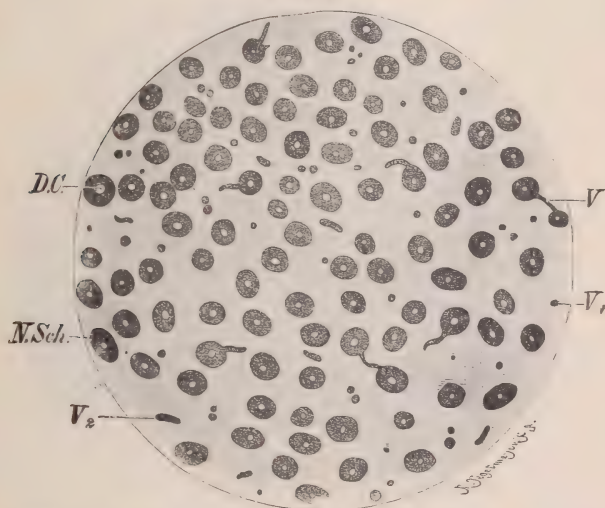


FIG. 13.—Transverse ground section through the dentinal tubules of the first molar of child (seven years). V. Koch and Golgi's methods combined. 1200 diam. Drawn from a photomicro.

present in old ones, and, in my opinion, only in the tracts of connective tissue which surround the vessels and nerves of the pulp.

As I have mentioned above, it was V. v. Ebner who first showed that gelatin-yielding fibrils occur in the ground-substance of the dentine, as in that of bone. In ground or in ordinary sections, mounted in Canada balsam, the dentinal fibrils are generally invisible, because their index of refraction is identical with that of the medium. But if we examine thin sections or scraped particles of a tooth decalcified in Ebner's fluid, the dentinal fibrils will be plainly visible. They are true gelatin-yielding fibers united in bundles of about $2\ \mu$ diameter. These fibrils arise when the upper portion of the protoplasm of the odontoblasts lying nearest the dentine is changed, and generally they run at right angles to the long axis of those cells. How this change is effected could not in all cases be made out with certainty. In some cases, I find, like V. v. Ebner, a most delicate fibrous struc-

ture between the distal ends of the odontoblasts. In other cases, the peripheral ends of the odontoblasts are first of all changed into a homogeneous layer of non-granular protoplasm, in which the fibrils become visible only later. *The dentinal fibrils, or the Tomes's fibers, are those remains of the cell-bodies which are left when the odontoblasts are changed into gelatin-yielding fibrils, and which retain their protoplasmic structure.*

Mummery found almost simultaneously with V. v. Ebner that the ground-substance of the dentine possesses a fibrous structure. But I cannot agree with the English author if he assumes that the pulp-fibers run between the odontoblasts, and then become the gelatin-yielding fibrils of the dentine. Figures of young developing dentine, as given in Figs. 7 and 8, are against such a view. Besides this,

FIG. 14.

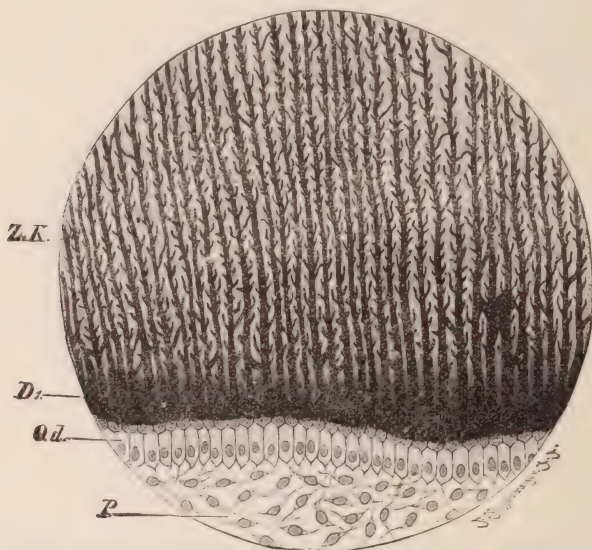


FIG. 14.—Ground section through the cuspid of man (twenty-three years). V. Koch's and Golgi's methods combined. *P.*, cells of the pulp; *Od.*, odontoblasts; *D.*, uncalcified dentine; *ZK.*, Neumann's sheaths of the dentinal tubules. 250 diam.

we have, as I showed above, to regard the pulp-fibers as protoplasmic processes of cells, which are from two to five times thicker than the delicate gelatin-yielding fibrils of the dentinal ground-substance. As Partsch correctly remarks, Mummery has examined pathologically-changed human teeth, or unfavorably preserved preparations, and thus some of his views, which differ from ours, are explained.

It has been known for a long time that in the formation of dentine a layer of uncalcified ground-substance is first deposited, and that the deposition of salts of lime begins only at some distance from the odontoblasts. These salts are secreted between the fibrils in the form of globular masses. I quite agree with V. v. Ebner when he supposes that the salts of lime are deposited only between the fibrils, while the latter themselves remain uncalcified.

Kölliker proved first that the so-called interglobular spaces of the dentine consist of uncalcified dentinal ground-substance, strongly resistant to acids. The protoplasmic dentinal fibers run unchanged through those spaces, as can be easily seen in wet ground sections. New histological methods have now proved to me that Neumann's sheaths, which inclose the dentine-fibers, and also most of the transverse processes are likewise nothing but the remains of uncalcified dentinal ground-substance which have experienced some chemical change, by which they have become resistant to acids and alkalies, like the enamel-membrane.

If we examine a non-macerated moist ground section of a tooth with a median magnification, we generally see that the dentine-fibers run unbranched close to the edge of the dentine, where they then form numerous dichotomous branches. The histogeny shows that those ramifications are, no doubt, real branches of the protoplasmic dentinal fibers, and are formed by the fusion together of the dentine processes of the young odontoblasts, so as to finally form a single process (Figs. 7 and 8). A true dichotomous branching of Tomes's fibers occurs only very rarely in the lower portions of the dentine. In such a case, the odontoblast has retained two processes for a longer period, the fusion taking place later on. Some authors assume a fusion of two neighboring odontoblasts to form one cell, to explain the deeper-lying dichotomous branching. But, in my opinion, such a fusion never takes place, and has certainly never been observed.

Besides those true ramifications of the protoplasmic dentinal fibers, there are everywhere in the dentine, between the dentinal tubules, exceedingly numerous and delicate transverse connecting branches, which, as Baume showed, become distinctly visible, especially when macerated dry ground sections are treated with acetic acid. Phosphoric acid, formic acid, or alum solution may be used instead of acetic acid. The action of these reagents should cause merely a superficial decalcification. The carbonic acid thereby produced then fills up the small spaces, and makes them plainly visible. Also in ground sections of carious dentine, prepared according to v. Koch's petrifying method, the transverse connecting branches become distinct, and form a pretty microscopic object when they are filled up by stained micro-organisms. But we look in vain for these connecting branches in sections of decalcified dentine, though the true terminal branches of the dentinal tubules are all the more distinct.

Two years ago I happened to treat a section of non-macerated tooth, hardened in alcohol, after Golgi's rapid method,* and saw to my surprise that not only the dentine-fibers, but also the interglobular spaces, Neumann's sheaths, and especially the numerous connecting branches, were stained intensely black, while the calcified dentine ground-substance had a light granular appearance. When

* Ground sections of teeth, preserved in alcohol, are placed for twenty-four hours in a 0.5 per cent. watery solution of potassic chromate (yellow), then washed with a very dilute solution of nitrate of silver, and placed for twenty-four hours in a 0.75 per cent. solution of the same salt. Afterward, both sides of the sections are again carefully polished upon a fine stone and mounted in hard Canada balsam, which is warmed on a glass slide over a spirit-lamp until fluid.

highest powers were employed, I found that the granular appearance of the ground-substance was caused by the gelatin-yielding delicate fibrils being also stained somewhat black, while the calcified portions lying between them remained quite white. As the fibrils run nearly at right angles to the direction of the dentine-fibers, they accordingly appear as fine black dots in transverse sections (Figs. 14-16). In sections in which Tomes's fibers are cut transversely, the fibrils can be traced in their course as delicate black lines.

In Golgi's method of staining, all organic constituents of the dentine are permeated by salts of silver and stained black, while the calcified portions remain unchanged. The best way is to prepare fairly thin ground sections of teeth preserved in absolute alcohol, to treat them after Golgi's method, and finally to grind again both

FIG. 15.

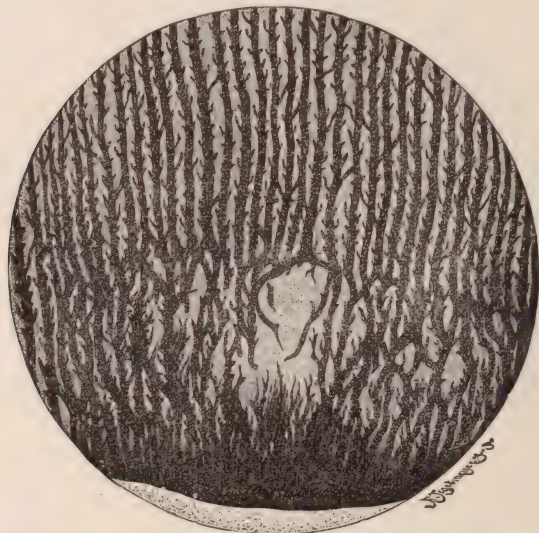


FIG. 15.—Reserve dentine from the root of a carious premolar. Wet ground section, stained with Golgi's method. 250 diam.

surfaces upon a fine stone, and to polish them carefully. From the beginning, only very thin sections should be used, because thicker ones are not always completely permeated, and, in further grinding, unstained portions are met with. As by employing Golgi's method only, *all* organic substance in the dentine is stained, some additional treatment is required to render the protoplasmic Tomes's fiber distinct from its Neumann's sheath. To effect this, I treated the sections first by v. Koch's petrifying method. By that means, from the pulp outward, Tomes's fibers, but not the dentine ground-substance, were permeated with Canada balsam. By now staining the sections according to Golgi, the protoplasmic portions, permeated by balsam, remained unstained, and showed up distinctly from the black stained ground-substance. In transverse sections they will then have an appearance like Fig. 13. The protoplasmic Tomes's fibers appear as white dots in the center of the black-stained Neumann's sheath. The

nearer to the pulp the section is taken, the more surely will the double staining succeed. I saw it most perfectly in the undeveloped teeth of *Macropus lugens* (marsupial). If the section is taken through the peripheral ends of the dentinal tubules, then the double staining will not succeed, especially in old teeth, because the balsam does not penetrate deeply enough into the thin Tomes's fibers.

The combined staining after v. Koch's and Golgi's methods has given me an entirely new clue as to the true nature of the very delicate connecting branches between the dentinal tubules. All former authors have regarded them to be lateral protoplasmic branches of Tomes's fibers. Waldeyer and others believed that there were connecting bridges between the odontoblasts, and that these became the fine lateral branches. For a long time I tried, but in vain, to find the

FIG. 16.

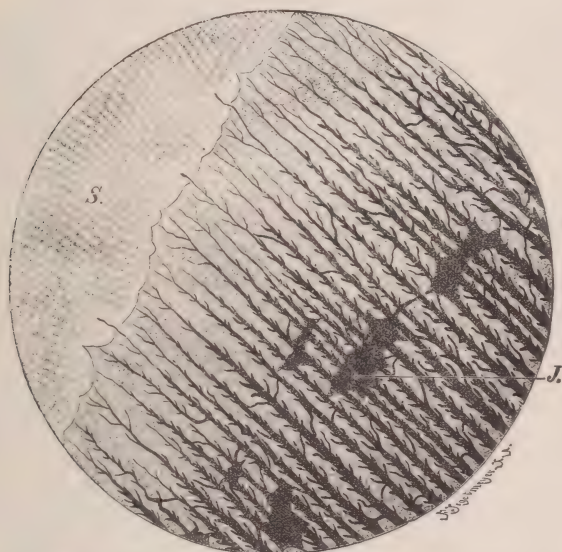


FIG. 16.—Longitudinal ground section through the crown of a cuspid of man (twenty-three years). Wet ground section, stained with Golgi's method. *J*, interglobular spaces; *S*, enamel. 250 diam.

supposed connecting bridges between the odontoblasts. Once, when examining the young odontoblasts of a cat, I thought I saw such a connection in the neighborhood of the dentine end of those cells, but then found that I had been deceived by the oblique turning off of Tomes's processes. If the supposed connections were really present, then they ought to be present also in older teeth, and also in isolated preparations. But no one has succeeded in finding them there. V. v. Ebner and v. Kölliker therefore supposed that the connecting branches of the dentinal tubules arise secondarily by a sprouting out of Tomes's fibers. This explanation seems to me still more improbable, as nowhere in the animal kingdom has such a phenomenon been observed as a process of a connective-tissue cell giving off numerous lateral branches in the form of a feather.

In sections of teeth which had been treated by the combined

v. Koch and Golgi methods, the entire layer of the last-formed uncalcified dentine is stained black. If the section has been taken through the pulp as well, there often lies between it and the odontoblasts a thin layer of unstained, granular, apparently protoplasmic substance. This tells in favor of V. v. Ebner's view, according to which the gelatin-yielding fibrils spring often not directly from their formative cells, but only at some distance from them, out of an undifferentiated metabolic product of the protoplasm. The protoplasmic dentinal tubules run, sharply defined, through the above-described thin intermediate layer, and disappear in longitudinal sections in the black-stained dentinal ground-substance. The Neumann's sheaths arise from the latter, like horsetail from the marsh (Figs. 14 and 15). They are connected at their lower ends by thick branches, which become thinner above, and represent the transverse commissures of the dentinal tubules.

The question remains to be settled, whether in the interior of those connecting branches, protoplasmic processes of Tomes's fibers occur. They ought, like the latter, to be permeated by balsam, and accordingly remain unstained. Besides this, they ought, in transverse sections, to communicate with the unstained Tomes's fibers. But nothing of all that is to be seen. As the connecting branches of the dentinal tubules run in various directions and in wavy lines, they will be cut obliquely and transversely in cross-sections. Only rarely are they hit exactly in longitudinal section between two neighboring transverse sections of dentinal tubules (Fig. 13). In no case was I able to convince myself that protoplasmic and unstained centers occur in the interior of the connecting branches. This can be studied best in a developing tooth of *Macropus lugens*, in a section right across the dentinal tubules, along the boundary of calcified and uncalcified dentine. The latter appears as a black plate, which is, sieve like, perforated by Tomes's fibers. The neighboring Neumann's sheaths are still partially connected in the calcified dentine, or by more or less thick transverse branches. Nowhere could I, in their interior, observe protoplasmic substance.

From these particulars we may arrive at a very simple explanation of the structure of the dentine.

First of all, a layer of uncalcified dentine is formed by the change of the peripheral portion of the odontoblasts into gelatin-yielding fibrils. The dentine calcifies by the deposition of salts of lime *between* the fibrils. The central portion of the odontoblasts retains its protoplasmic structure, and forms Tomes's process or the dentine-fiber. A tube-like portion of the dentine ground-substance around each dentine-fiber remains uncalcified, and forms Neumann's sheath. The numerous fine connecting branches between Neumann's sheaths are also remains of the uncalcified dentine ground-substance, and are not lateral outgrowths of the dentine-fibers. Not to be confounded with them are the true dichotomous branches of Tomes's fibers, along the boundary between enamel and cement.

The younger the dentine, the thicker are Neumann's sheaths and the connecting branches. With growing age they decrease in volume, since their superficial layers calcify more and more. The connecting branches become very thin, especially in the crowns of teeth of older persons, and they partially disappear by complete calcification. As

this calcification goes on, progressing throughout life, the protoplasmic dentinal processes of the odontoblasts become affected. They are changed on their surface into the dentine ground-substance of Neumann's sheath, and represent, in the so-called transparent dentine, only extremely thin protoplasmic fibers.

I am not able to say whether the dentine ground-substance of Neumann's sheaths undergoes any chemical change. They are exceedingly resistant to acids, and they are also the last elements to be affected by caries. I think it very probable that this resisting power

FIG. 17.

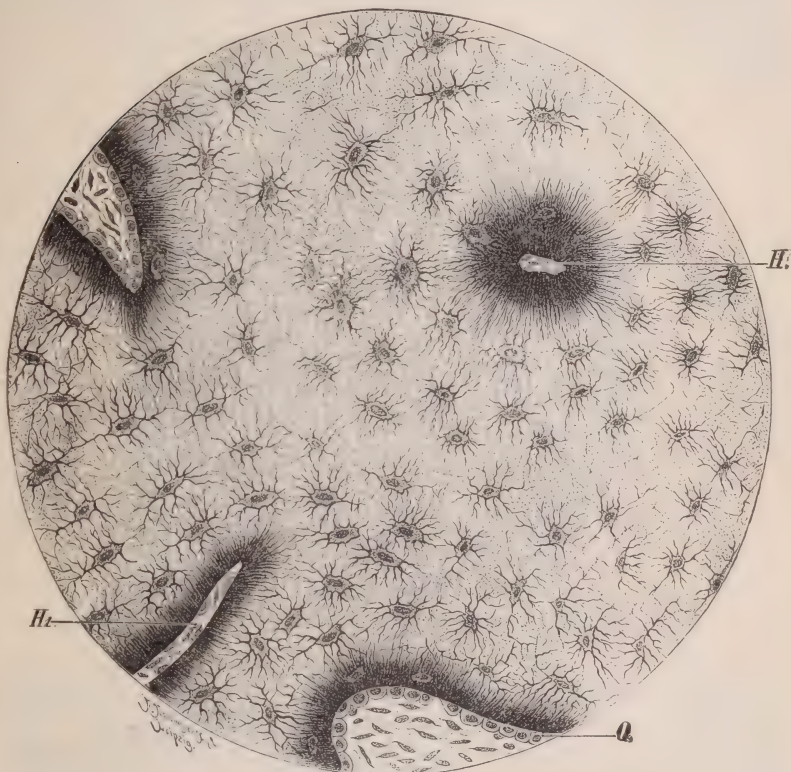


FIG. 17.—Lower jaw of calf, stained with Gerlach's carmine. Ground section treated after v. Koch's petrifying method and Golgi's rapid method. *H*, Haversian canals in transverse section; *H*., Haversian canals in longitudinal section; *O*, osteoblasts. 300 diam. Drawn from a photomicro.

is caused by some chemical product deposited between the gelatin-yielding fibrils. The calcified ground-substance of the dentine is also very resistant to acids, although in a less degree than Neumann's sheaths.

One can best convince oneself of the correctness of the above description by treating with acids a ground section taken through the crown of a tooth. The delicate connecting branches between Neumann's sheaths are usually invisible if the section is taken from an old tooth. But they appear clearly when, by the application of

acid, they are filled up with carbonic-acid gas. The more the decalcification goes on, the broader become the connecting branches, the decalcification progressing from these spaces. The space between each two of Neumann's sheaths has, in this stage of the decalcification, a ladder-like appearance, the rungs being formed by the connecting branches. Between each two of those rungs and two Neumann's sheaths there lie then somewhat quadrangular shells of still uncalcified dentine, which, however, are soon dissolved. If the ground sections be entirely decalcified, the delicate connecting branches will no longer be visible as in ordinary decalcified sections. They form now a part of the equally decalcified ground-substance, in which can be clearly defined only the protoplasmic Tomes's fibers, and, when the section was first macerated, the cavities of Neumann's sheaths.

FIG. 18.

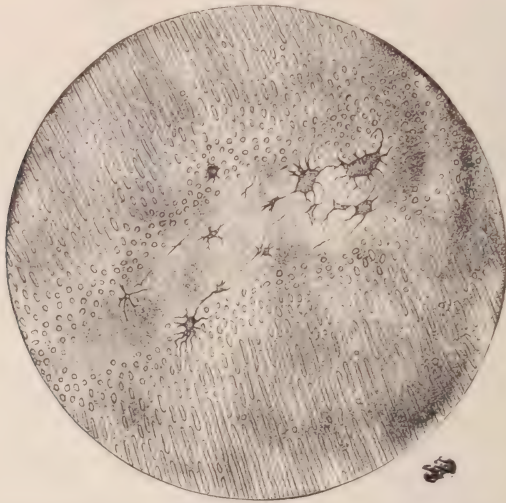


FIG. 18.—Osteo-dentine in an enamel-less rudiment of a human tooth. 250 diam.

Decalcified ground sections, or ordinary sections of teeth, may remain for twenty-four hours in concentrated nitric acid, without the connections of the dentine ground-substance being destroyed. But if the section, lying in acid on a slide, is warmed over a spirit-lamp, then it begins to melt away. First of all disappear the parts formerly calcified, and afterward the connecting branches. The isolated Neumann's sheaths shrivel, and lastly are also dissolved. If the heating be discontinued at the right moment, the isolated Neumann's sheaths may be preserved in direct connection with the lateral connecting branches.

The formation of the bone-tissue is very similar to that of the dentine. There is only this difference, that in the development of dentine the same odontoblasts remain active throughout life as formative cells; only their dentine processes, Tomes's fibers, have nutritive function. Whereas, in the case of bone, after the osteoblasts, by a change of their peripheral cell-body into gelatin-yielding fibrils have produced the bone ground-substance, they are inclosed by the latter,

and have, *in toto*, only the function of organs of nutrition, while the formative activity is taken up by constantly fresh-formed cells of the bone-marrow or periosteum.

If we take sections of bone thoroughly macerated or boiled in caustic potash, and examine them dry, or after treatment with aniline dyes, we find the well-known lacunæ, and, proceeding from these, the delicate canaliculi, communicating with one another like cobweb. But if we examine sections through decalcified bone, we see, instead of the lacunæ, typical star-like connective-tissue cells, with *short* processes. Nothing is here to be seen of the branching connections between the lacunæ. If we steep young or developing bone in alum-

FIG. 19.

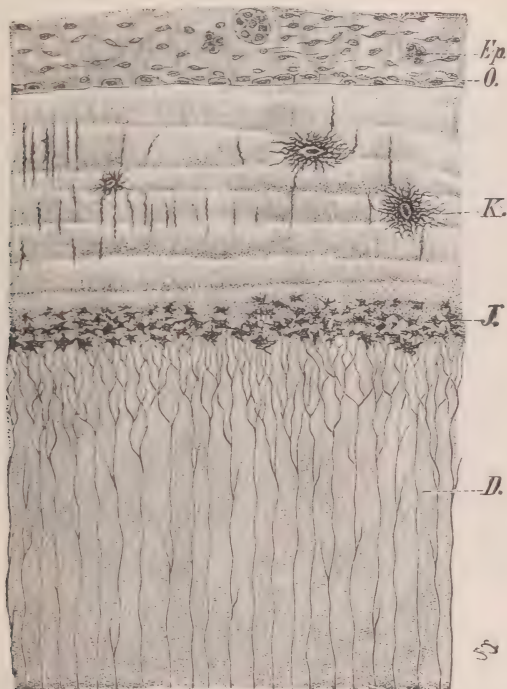


FIG. 19.—Ground section through the root of a human premolar, according to v. Koch's petrifying method. *D*, dentine; *J*, interglobular spaces; *K*, bone-corpuscles of the cement; *O*, osteoblasts; *Ep*, remains of Hertwig's epithelial sheath. 200 diam.

carmine, and afterward, for twenty-four hours, in a faint blue solution of Bleu de Lyon in absolute alcohol, then the decalcified ground-substance is stained intensely blue; the nuclei of the bone-cells are red, the protoplasm pale red. The protoplasm shows up very plainly against the bone ground-substance, and one sees that the star-like bone-cells have only quite *short* processes. Nothing is to be seen of the web-like thin processes which are visible in dry sections.

Having sawn the lower jaw of a calf, preserved in sublimate and alcohol, into plates about two mm. in thickness, stained them with Gerlach's carmine, treated them according to v. Koch's petrifying method, and ground the plates to thin sections, I found that the

nuclei of the bone-cells and of the soft structures are stained bright red, the protoplasm being fairly well defined from the more gray-colored calcified ground-substance. In the neighborhood of most of the Haversian canals, which are still pretty wide, there is a narrow, bright red stained layer, the zone of the still uncalcified bone, in which the bright protoplasm of the inclosed bone-cells is vividly shown up. We obtain an exceedingly pretty picture by further treating with Golgi's rapid method (Fig. 17). The uncalcified bony layers in the neighborhood of the Haversian canals, formerly stained bright red, are now deep black. The bone-cells, with the red nuclei and clear protoplasm, show up distinctly. All the bone-cells have the typical

FIG. 20.

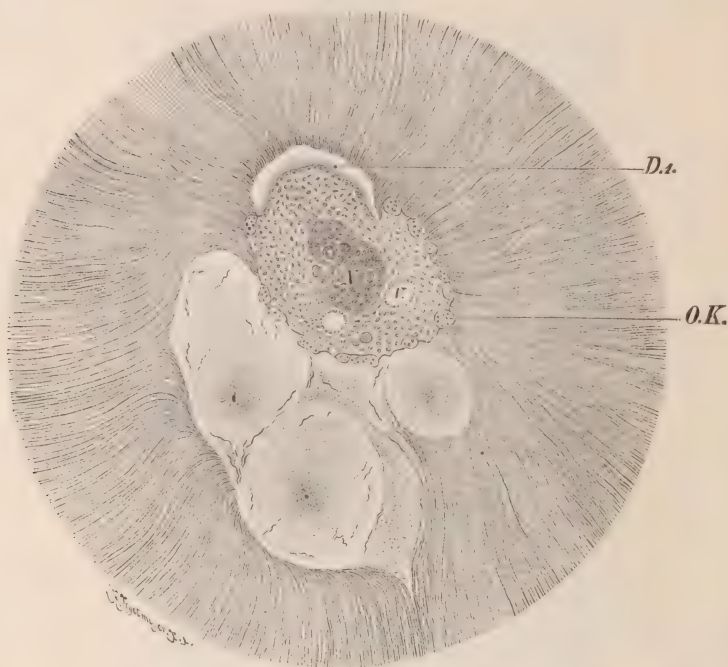


FIG. 20.—Ground section through the root of a human premolar, with three interstitial denticles and processes of resorption in the pulp, according to v. Koch's petrifying method. *N*, nerve; *V*, vein; *D*, uncalcified dentine; *O.K.*, osteoclasts. 50 diam.

appearance found also in sections through decalcified bone. Around each cell there is a thin layer of black-stained uncalcified ground-substance. From there radiate in all directions the many-branched canaliculi, also stained intensely black, which in the neighborhood of the Haversian canals pass over directly into the uncalcified ground-substance of the bone. This uncalcified ground-substance is absent from the neighborhood of the Haversian canals when the bone has ceased to grow, but in other respects its appearance is the same.

Thus we arrive at the following view as to the structure of bone: The osteoblasts are changed on their surface into the gelatin-yielding fibrils of the ground-substance discovered by V. v. Ebner. The ground-

substance calcifies by a secondary deposition of salts of lime between the fibrils. To maintain proper nutrition for the tissue, a part of it remains uncalcified in the form of a delicate, many-branched system of tubes, and also of a continuous layer around the bone-cells. *This latter layer resembles in all respects the Neumann's sheaths of the dentine*, and can, by the action of concentrated nitric acid for several hours, be isolated, in connection with a few adhering primitive tubules. Thus one obtains the so-called bone-corpuscles of Virchow.

Thus we see that there is an extraordinary similarity between the structures of bone and of dentine. We find all transitions between these two tissues among the lower vertebrates, and also in man occurs so-called osteo-dentine,—*i.e.*, dentine which contains true bone-corpuscles (Fig. 18).

The cement is almost identical with bone. In many cases it contains, indeed, no bone-cells, but otherwise it shows the same concentric structure as bone. In cement also we find gelatin-yielding fibrils.

In human dentine we sometimes meet with certain round, calcified structures, some of which are permeated by numerous irregular canals; others may be either free from protoplasmic inclosures, or contain bone-corpuscles. These so-called "denticles" or "odontheles" are formed in the pulp during the development of the dentine, from pulp-cells which resemble osteoblasts, and are only secondarily invested by typical dentine. These denticles show usually a circular stratification, and are also often radially striated. Sometimes they appear more like dentine, sometimes more like bone. They are very frequent in some mammals,—*e. g.*, in the elephant.

Postscript.—V. v. Ebner, who received from me by letter the results of the above investigations, cannot easily imagine that all fibers of the pulp are unchanged cellular processes, and thinks rather that they are perhaps fibers of a special kind, analogous to the zonula-fibers. I will not question the possibility of its being so. This point has to be settled by further research.

THE IODOFORM QUESTION.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

IN the August number of the DENTAL COSMOS, page 614, Dr. Maxfield, of Holyoke, Mass., makes some criticisms upon my article on the iodoform question (DENTAL COSMOS, Feb., 1893), to which I desire to reply, in view of the fact that the points touched upon are of fundamental importance. The subject is one that has never been dealt with experimentally by any dentist except very superficially, and opinions regarding it being up to date still divided, I did not consider it necessary to offer an excuse for presenting a series of experiments on this subject even "at this late day."*

* The unqualified statement that iodoform is not an antiseptic indicates only a partial study of the subject. It is now universally conceded to act as a weak antiseptic toward the bacilli of cholera and tuberculosis. It has also been found under certain circumstances to manifest antiseptic action toward the bacilli of septicæmia of mice and rabbits. Behring claims for it antiseptic properties when in a very fine state of division, and others ascribe antiseptic properties to it when in solution. (Consult references below.) At all events,

Dr. Maxfield begins his criticisms with the statement that my article appears somewhat misleading in its presentation of facts. The facts are, however, presented just as revealed by experiments, and I think the following considerations will show that there is no just reason for calling them misleading.

The first three series of experiments dealt solely with the antiseptic action of iodoform under varying conditions, and resulted in establishing the facts hitherto certainly not determined: (1) That iodoform incorporated with putrid matter from dental pulps does not exert a devitalizing action upon the bacteria present; (2) that where iodoform incorporated with pulp-tissue was introduced under the skin of mice, in some cases a marked retarding action upon the development of the bacteria was exerted, traceable, however, to other causes than any antiseptic action on the part of the iodoform.

The present generally accepted opinion regarding iodoform was sufficiently clearly expressed in the following sentence from page 90 of my communication:

"According to the views adopted at present, theory and practice seem to agree pretty nearly that a wound-surface, especially a secreting one, is favorably influenced by iodoform, not so much because of its antiseptic action as because of its power to take up the secretions of the wound, as well as the products of decomposition and bacterial poisons (ptomaines, toxalbumins), and to act upon them in such a way that they lose their toxic properties."

Dr. Maxfield does not think that this point was sufficiently emphasized, and finds fault with me for not having called attention to the experiments of "de Ruyter, Senger, and others, that when iodoform was established in a wound, if later anthrax organisms were inoculated, no poisoning resulted." This, he affirms, "would have illustrated the importance of using a remedy like iodoform in the treatment of diseased conditions that we find in the teeth and mouth." Here I am afraid that Dr. Maxfield must submit to the same charge that he brought against me,—namely, misleading facts. In the first place, I am not aware that de Ruyter ever made any experiments on the subject mentioned, and as for the "others," Löte* and Schnirer† arrived at results just the opposite from Senger, nor could Kronacher‡ make his results harmonize with Senger's.

Indeed, Senger himself found that when the animal was first infected with anthrax bacilli, and iodoform applied subsequently, it was utterly powerless to impede the progress of the disease. Now, since we in operations upon the teeth invariably have to do with cases where the infection has taken place days, weeks, or even months before, the only inference possible from Senger's experiments would be that iodoform would be as useless in treating diseased teeth as it was in treating experimental anthrax when applied subsequently to the infection.

the view that iodoform is under all conditions devoid of antiseptic action is not so universally recognized as to be accepted without question for the conditions present in putrid pulps, or to render experiments relating to it superfluous.

* *Centralblatt für Bacteriologie und Parasitenkunde*, Bd. ii, 1887, No. 7. p. 189.

† *Münchener med. Wochenschr.*, 1887, No. 29.

‡ *Wiener medicinische Presse*, 1887.

Again, if iodoform were proven to be a valuable agent in the treatment of anthrax (although I do not know of a single case of anthrax ever having been cured or even bettered by the use of iodoform), this would not by any means justify the inference that it must be equally valuable in treating diseased conditions of the teeth.

This point illustrates what I must call a serious error that we constantly meet with in dental journals; that is, seizing upon any one fact found somewhere in general pathology or bacteriology, generalizing it and applying it to all possible conditions of the teeth, which often have not the slightest resemblance to the condition to which the fact originally applied. I think that the Duke of Argyll puts it very properly when he says, "We should be awake to the constant liability of even the greatest observers to found fallacious generalizations upon a few selected facts."

The principles of general surgery do not by any means *always* apply unchanged to operations upon the teeth, and much has been written about asepsis and antiseptics, or even asepsis *versus* antiseptics, which a proper appreciation of this fact would have shown to be illogical.

The general surgeon has it in his power, in a fair proportion of his cases, to operate upon an aseptic field, while the dentist, in treating cavities of decay and putrid root-canals, has to work upon infected tissue. The surgeon is sorely restricted in the use of antiseptics because of their action upon the living tissue, while the dentist, in the operations just referred to, is much less hampered by such consideration, and *with proper precautions* can employ antiseptics in almost any desired concentration. Furthermore, the small quantities required by the dentist in operations upon the teeth permit of using antiseptics in concentrations which the surgeon would not dare to think of employing through fear of a general toxic action. The surgeon, again, is usually able to take advantage of the most important factor, drainage, while we, in our operations, except where a fistula has been established, are exceedingly restricted in this particular. It will, furthermore, seldom happen that the surgeon will be called upon to treat an abscess through an opening only a fraction of a line in diameter, or to apply his medicaments through narrow and sometimes tortuous tubes like the canals in the roots of teeth.

All this makes the treatment of diseased teeth *in some respects* an operation *sui generis*, and it may not always be permissible to take for granted that methods and materials which have given the best results in general surgery or pathology can be relied upon, unmodified, to give the best results in the treatment of the teeth. When, for instance, one author tells us that he succeeded in curing an ulcer of the leg with oil of cloves where everything else had failed, he is not justified in concluding from this that oil of cloves must be superior to all other medicines in the treatment of putrid conditions in the canals of teeth.

It is true that in my article I might have given more attention to the question of the action of iodoform upon bacterial poisons (ptomaines, toxalbumins), but, as I stated, "it would lead me too far to attempt to consider even a small proportion of the communications that appeared on this subject."

Furthermore, my fourth series of experiments deals directly with the subject, with the result that "the experiments so often turned out

in favor of the iodoform, especially where very putrid material had been used, that its good effects could not be mistaken," a result which I attributed "more probably to a destruction of the poisonous chemical substances in the putrid pulp-tissue" by the iodoform.

Dr. Maxwell would accordingly have found in my own article arguments much more in favor of his position and much more to the point than any results obtained from experiments on anthrax, even if they had been positive instead of negative.

Let us now examine more closely the question of the action of iodoform upon ptomaines in its relation to the treatment of diseased teeth. It was pointed out by Grawitz* and Scheuerlen† that certain bacterial products, in particular cadaverin, putrescin, furthermore sterilized putrefying solutions from rabbit-meat, sterilized and concentrated extracts from staphylococci, possess the power of exciting suppuration without the presence of the bacteria themselves. This suppuration is, however, wanting in the progressive character shown by suppurative processes where bacteria are present, and where, consequently, new quantities of ptomaines may be constantly being formed. I also found and pointed out‡ that suppuration produced by pieces of putrid pulps was always much more severe than that produced by pure cultures of the bacteria obtained from such pulps, and I may here add that putrid pulps produce more severe reaction than simply abscessed ones. Behring,§ following up the experiments of Scheuerlen and de Ruyter,|| found that the ptomaine cadaverin, as well as ptomaines which he isolated from pus and infected blood-serum, lost the power to produce suppuration when mixed with iodoform. Although this discovery did not establish the fact that *all* ptomaines are so decomposed by iodoform, it was looked upon as furnishing at least an indication of the cause of the undoubted beneficial action exerted by iodoform upon suppurating surfaces, particularly when much decomposition was present.

Rovsing¶ sharply criticises the conclusions of de Ruyter, and points to the fact that the admixture of iodoform to cultures of virulent pyogenic cocci or to infectious pus does not in any way diminish the pathogenic effects of the material. Also Baumgarten (*Verschiedene Jahresberichte*) repeatedly seeks to enforce the idea that too much importance is attached to the results obtained by de Ruyter and Behring, and points to the fact that even Brieger** was not able to find toxins in pure cultures of pyogenic cocci, and that these organisms are able to produce suppuration entirely without the help of any ptomaines.†† This celebrated bacteriologist and pathologist (Baumgarten), as well as Kunz‡‡ and others, emphasize the fact that

* *Virchow's Archiv*, Bd. cx, 1887, S. 1.

† *Fortschritte der Medicin*, 1887, No. 23.

‡ *Independ. Pract.*, 1888, p. 341.

§ *Deut. med. Wochenschr.*, 1887, No. 20.

|| *Centralbl. f. Bact. u. Parasitenk.*, 1887, Bd. ii, No. 23, and *Arbeiten aus der chirurgischen Klinik der Universität Berlin*, Theil iii.

¶ *Fortschritte der Med.*, Bd. vi, 1888, No. 15.

** *Berliner klin. Wochenschr.*, 1886, No. 18.

†† Manfredi and Traversa succeeded later (*Giornale internaz. delle Sci. med.*, 1888) in obtaining toxic effects from sterile filtrates of streptococcus cultures in bouillon.

‡‡ *Beiträge z. pathol. Anat. u. Physiol.*, Bd. ii, Heft 2, 1887.

the action of iodoform is restricted chiefly to such cases where saprophytic bacteria are present or where putrefactive processes accompany the suppuration. This view agrees with the results obtained by me, for I found that "especially where very putrid material had been used, its (iodoform's) good effects could not be mistaken."*

Schnirer† found that iodoform did not appreciably diminish the deleterious action of pyogenic staphylococci and streptococci, or anthrax bacilli, in the animal body. Neisser‡ states that iodoform in the animal body possesses antiseptic action in relation to the bacilli of cholera, anthrax, mice and rabbit septicæmia, but not in relation to staphylococci and streptococci.

Jeffries§ found that iodoform has no devitalizing action upon bacteria, though in some cases he found their growth retarded by it. Tilanus|| comes to the conclusion, after a study of the more recent communications on this subject, that iodoform has a very doubtful value in the treatment of acute infections of wounds. At the Seventh International Congress of Hygiene and Demography (1891) the opinion was advocated that iodoform acts by attracting phagocytes, while in a recent communication to the Academy of Paris Dr. Maurel reports experiments which "tend to show that the action of iodoform can be explained by the fact that it increases the vitality and destructive power of the leucocytes upon the organisms, and at the same time diminishes their virulence."¶ Others again ascribe the favorable action of iodoform to its desiccating power. Finally, Baumgarten** concludes his remarks with the statement that "this is in full accordance with the fact that iodoform as a surgical antiseptic (in the treatment of wounds), at least when employed alone, has been almost universally discarded."

It would be easy to fill up a whole number of the COSMOS with citations relating to the action of iodoform, but the above will suffice to show that the question is by no means so simple a one as Dr. Maxfield appears to assume. They also show that the view that iodoform is a remedy which is to be indiscriminately used in all cases of inflammation or suppuration is by no means universal among authorities on the subject.

To return to the dental uses for iodoform, even taking for granted that it has the power to destroy the bacterial poisons produced in diseases of the teeth, what uses can be made of it?

It would be worthless, first, for sterilizing cavities of decay, because it does not possess the power to penetrate the dentine; second, its use in treating exposed pulps would be limited to the cases mentioned in my first article.

The chief question, however, is, What advantage could we take of its antitoxic power in the treatment of putrid canals? Our first

* DENTAL COSMOS, February, 1893, p. 95.

† "Ueber die antiseptische Wirkung des Iodoforms," *Wiener med. Presse*, 1887, Nos. 36-38.

‡ "Zur Kenntniss d. antibacteriellen Wirkung d. Iodof.," *Virchow's Archiv*, Bd. cx, 1887.

§ "The Antibacterial Action of Iodoform." *Amer. Journ. of the Med. Sciences*, Jan. 1888.

|| *Münchener med. Wochenschr.*, 1889, p. 545.

¶ *Journal of the British Dental Association*, September, 1893, pp. 651, 652.

** Seine Berichte, Jahrgang 1891, p. 771.

endeavor, in treating such cases, is to thoroughly remove the putrid matter mechanically; having done this, there will be little need of an agent to act upon the ptomaines. We *do* need an antiseptic, however, to destroy any chance bacteria which may remain sticking to the walls, and which, especially if at the apex, may, by proliferating at any future time, endanger the success of the operation.

In case we do not succeed in removing the entire remains of the putrid pulp (let us say that the canal is cleansed only two-thirds of the way to the apex), how does iodoform then act? We cannot sterilize the remaining third by the use of iodoform; but can we render the bacterial poisons contained in the pulp-tissue inert by it? I think we must answer, No, unless we can *thoroughly* incorporate the iodoform with the pulp-tissue in every part, which, in the category of cases under consideration, is extremely difficult and often impossible.

Both experiment and experience have demonstrated that iodoform does not possess any penetrating action on a column of dead matter. It was a very common experience at a time when iodoform was indiscriminately used by all for treating all possible cases, to split open a tooth which had been extracted on account of acute pericementitis, and to find the canal packed one-half to three-quarters full of iodoform, smelling as strong as it did the day it was put in.

I am perfectly willing to admit, and indeed must admit in conformity with the results of my own experiments (fourth series, p. 94 in the DENTAL COSMOS), that iodoform thoroughly incorporated with putrid pulp-tissue does *usually diminish* the intensity of the infection caused by it, but the difficulty of accomplishing this incorporation in narrow root-canals, in my opinion, offsets any probable advantage which would be derived from it.

In the treatment of alveolar abscesses, it might be reasonably expected that iodoform would be of service if it could be freely applied; but to fill the root-canal with iodoform in the hope that it will work through the apical foramen in sufficient quantity to come into contact with all parts of the abscess, would be very like punching a bit of iodoform through a glass tube upon an ulcerating surface or into an abscess-cavity, and the successes reported from such use of iodoform when it was first introduced are to be attributed chiefly to the mechanical cleansing of the canal and to the antiseptics employed in connection with the iodoform. (Dr. Maxfield recommends "thoroughly cleansing the parts with some germicide, such as corrosive sublimate solution and hydrogen peroxid," before applying the iodoform. No doubt such treatment would be successful in the vast majority of cases.)

When, however, we are able to thoroughly inject the abscess with a solution of iodoform (in glycerin or in alcohol and ether, etc.), I am quite willing to acknowledge the possibility of a favorable action.

Smreker* injects an emulsion of iodoform in oil of eucalyptus or in carbolic acid; he has had no success, however, in torpid cases.

Smreker remarks that my conclusions regarding the value of iodoform in the treatment of pericementitis, etc., have turned out a little too harsh.

* *Oesterreichisch-ungarische Vierteljahrsschrift für Zahnheilkunde*, Jahrgang 1893, Heft i, S. 32, *et seq.*

Brubacher (*Deutsche Monatsschrift für Zahnheilkunde*, October, 1893) uses a paste consisting of iodoform 5.0, salol 3.0, and cacao butter 10.0. He claims that this penetrates to and even through the apical foramen.

With regard to poisoning through iodoform, which Dr. Maxfield is inclined to doubt, I need only call attention to the fact that in the first year following its introduction, when it was used altogether regardless of quantity, cases of intoxication, frequently ending fatally, were reported by the score, or, as Kolaczek* expressed it, the cases were piled up in such a startling manner that König† issued an appeal to his colleagues warning them against such an indiscriminate use of the drug. I am not of the opinion, however, and have never expressed myself so, that there is danger of intoxication from the small quantities used in dental practice.

This fact, we must remember, applies as well to other drugs. We make constant use of drugs and concentrations in dentistry which on account of their poisonous character have a much more limited use in general surgery.

I do not agree with Dr. Maxfield that iodoform has been slighted by the dentists. There is certainly no material which has been more universally used, though of ten who formerly used it nine may have put it aside for some other drug. This fact, however, resulting from clinical experience, does not speak well for iodoform, at least as hitherto employed in dental operations.

THE STATUS OF THE D.D.S.

BY HENRY BURCHARD, PHILADELPHIA, PA.

DISCUSSION of this question presupposes the elimination of the element of personal or class vanity, which in this instance is more than an equivalent of the personal equation of the astronomer.

As we have to do with the true significance of words, and definition, apparent word-quibbling must find excuse through a reference to John Stuart Mill's immortal treatise on logic. This will demonstrate the force of these agents and the necessity for their accurate application.

As the D.D.S. degree itself is the primary cause of whatever contention there may be, an examination must first be made of those three words: the Doctor of Dental Surgery.

One who is learned in the principles, skillful in the operations of surgery, as applied to diseases or disorders of the teeth and associated parts,—this the degree states explicitly.

The surgery a primary, the field a secondary, the "learned" a last, and designed as a corollary.

As we are all presumably evolutionists (with the honorable exception of Dr. Bonwill), we turn naturally to a retrospect of dentistry,—its whence, looking here for aid in this "tempest in a tea-pot," which is disturbing certain professional elements. Perhaps such a view may throw a little light upon the "is and where of dental practice."

* Guttman's Jahrbuch der Medicin, 1882, S. III.

† Centralbl. f. Chirurgie, 1881, No. 52.

If we believe (as evolutionists, of course we should) the generalization of Herbert Spencer, "All things tend to a definite heterogeneity, out of an indefinite homogeneity," following this course of observation may give our question an answer, at least in part. This need not be viewed as a formidable undertaking; it is by no means necessary to wrestle with all of the "Synthetic Philosophy." Occasional reference to the works of John Fiske will demonstrate the principles to be applied.

This will cover a period from the days of sphagiologic observations for the cure of odontalgia to these times of contour filling, bridge-work, and the revival of mineral inlays.

Take such a review, and what fresh light do we secure?

As this retrospect is to embrace only such elements as will serve to form a chain, we can exclude Chinese practice and that of the Egyptians. The latter, it is true, subdivided medicine into specialties; of these "dentistry" was one. Herodotus states this explicitly. The division was one, presumably, of convenience, not necessity. There is no evidence that the extent of knowledge was the cause, so we may dismiss this unique race, and confine ourselves to Aryan progress. Necessarily our review must be of surgery and medicine proper, as the only distinct proof of dental practice is the existence of certain remains of Etruscan origin. Incidentally, recent observation shows the existence of a "dentistry" among the, or an, intercontinental race of America. This, however, is foreign to the present argument.

Hippocrates must be taken as the first link, as Sanscrit writings furnish us with no data fit for use. In his treatises medicine and surgery are included without distinction. Obstetrics, with which we are but remotely concerned, remains as a practice among the "old women."

Dental operations, we may infer, were but a trifling incident in his practice; truly a minor surgery. It is important, however, as furnishing certain principles.

Celsus and Galen follow substantially the same course; each adds material of practical value; the same of the school of Alexandria, but the stores of knowledge of such magnitude that any one person could master them.

The practice of the healing art and medical science remain now for six hundred years *in statu quo*, until the advent of Saracen and Jewish medicine. In the ninth century we have but darkness. Even their work is in the main an adoption and adaptation from the teachings of classical periods. When the sky clears for the birth and progress of modern surgical and medical science (meaning by this the past four or five hundred years), what do we find? One class of individuals recognized as physicians (among these the always-to-be-honored alchemists), another practicing surgery and the barber's trade together (sow-gelding an occasional accompaniment). Even this last is not to be despised, for, as is well known, such an incident proved of value to obstetrics.

In medicine sphagiologic practice of antiquity has substituted for it the doubtful advance of priestly exorcism. Surgical practice is quite as crude, although it must be granted the knowledge of useful principles is greater. There were frequent contests between these

two bodies, and one can picture the comedy of warfare between a Sangrado and a barber.

Some of the surgeon-barber class, by study and observation, acquire knowledge and ability sufficient to remove them from recognition with their hair-trimming confrères.

It was not long before this rejuvenated body rivaled, then outdid, the "physics" of the day.

It was demonstrable that their practice was more sure, their knowledge of anatomy and disease-process more accurate.

Medicine had not yet learned the lesson, afterward taught unknowingly by Hahnemann : that much of disease is self-limited.

The ranks of any body furnishing Wiseman, Paré, Desault, Hunter, need not demand recognition ; it will be literally forced upon them. No science or art constituting a parent stem will or can ignore anything, any class, which gives more than it receives.

Equality is soon demonstrated, at least implied, by the same basis of education being set for both : the surgeon now to acquire the more general and abstract knowledge of the medical practitioner, he on his part to use the stores of anatomical and pathological information supplied through the labor of the surgeons.

Working harmoniously, the united energies of these two bodies furnish such a mass of knowledge that one individual is incapable of grasping it in totality. There arises naturally the necessity of subdivision. One devotes his time to ophthalmology, another to laryngology and rhinology ; one to the treatment of diseases of the pulmonary organs, another the nervous system, etc. These all being distinguished as specialties. Each of these, even what is perhaps least, otology, is a branch of a parent stem ; in each a general medical education has been a necessary preliminary to the special practice.

This applies whether the specialty be one of medicine or of surgery. In medicine, however, there is such a close interdependence of parts that extensive division is impracticable.

Recognizing the basis of education to be the same for both branches, we can confine discussion to surgical subdivisions.

A specialist of medicine or surgery is therefore one who has supposedly mastered the general principles of a science and applied them to a selected field.

Accepting this definition (as to-day we must), a dental practitioner is evidently not a surgical specialist, if we accept the term in an accurate sense. He has not fulfilled the primary requirements to justify him in asking admission to the better-grounded classes. Logically, therefore, we must exclude the dental practitioner from the class of specialists.

Professor Garretson will be recognized by his pupils in this characteristic epigram, "If dentistry be not a specialty of medicine, it is a trade." This, it is presumed and assumed, to include in the category of trades all handicrafts. Denying its identity as a specialty of surgery, how if viewed as a trade, a handicraft?

We have a class of individuals who have three-fourths their time devoted to the performance of operations clearly mechanical in nature.

From mere pounders and scrapers of metal and ivory ; they have come to a skill which combines the work of the sheet-metal manipulator, lapidary, jeweler, and artisans of the highest type. From those

who wedged, stuffed, foil into an inclosed space have come craftsmen in metal but little inferior to Benvenuto Cellini.

Holding this comparison, such men are more akin to followers of a fine art than to mere artisans, and yet are removed also from the surgical specialists. Granting even this, we cannot, with the idea of accuracy of definition in mind, define dentistry as a fine art, close as at times it may be.

In the prosthetic branch we have men calculating (save mathematically) with the accuracy of engineers, planning as architects, and executing with some of the skill and taste of the sculptor.

Even granting this, the work is a high type of mechanical art, but distinguished as a something higher than the work of an artisan.

A dental practitioner in the doing of a contour operation plans as an architect, constructs as an engineer, executes with the taste of an artist,—and this by working as an artisan. The same, if applied to the making of plates, bridges, and the arranging of artificial teeth. The proper bases of support, and the correct placing of resistances to strains, will form the science and art element here.

Further reasoning is unnecessary to place "a dental practitioner" on a higher plane than a follower of a handicraft.

Now that we have excluded the special-practitioner and handicraftsman aspects, how, if viewed as a separate, a distinct profession, is dentistry, or should it be regarded as a profession in itself?

What constitutes a profession? While definitions were framed before dentistry assumed its present proportions, they were to this effect: "A profession is any calling requiring a learned education" (Worcester). Another (Stormonth): "Any calling engaged in for subsistence not mechanical, and opposed to trade."

These, of course, do not sufficiently define, nor are they accurate enough.

A further illustration may be serviceable here,—the distinction between science and art. Be it understood that professions have necessarily a foundation in science.

A science we recognize as practice based upon a regular and orderly sequence of events, recorded as to cause and effect, and having such relation constant. Any calling may be said to have a scientific basis which uses these generalizations of phenomena termed principles, and applies them to a practice. It will be seen such a thing is the antithesis of pure empiricism. Art is by nature empiric, although certain phases of the arts may appear to have an element of contradiction to such a statement. True though this may be, there are distinctions in the arts. One who applies to production a routine practice, without further inquiry than such a procedure is followed by a certain result, does the work of an artisan. The artist attains by a greater though similar form of knowledge results more difficult of achievement, the effects being varied to suit the worker. A scientist, by a knowledge of what we term natural laws, foretells with a tolerable or exact degree of certainty what his results will be. Once more, it is the followers of this last method who are worthy of being considered as members of a learned profession. Diverge from it, and in that degree one becomes a follower of mechanical art.

What are the separate professions? Law, medicine, engineering, and divinity. Engineering here to be understood as including all

planning of operations necessitating the manipulation and economical use of physical agents.

Each of these will be seen to be an individual. Association with one another is occasional and accidental. Virtually each is independent of the other.

We have two evident associations of dentistry: one with surgery, the other with engineering. Strip from it its engineering features, and it loses one-half its substance. Deprive it of its surgical connection, what then is left?

Thus, as we have a calling directly dependent upon two others for existence, the claim as a separate profession becomes invalid. As an independent entity, it is not, cannot be!

Dr. James Truman has somewhere written or said, "Personally I am indifferent whether I belong to the medical profession or not, so long as I know I am part of the dental fraternity,"—an expression of contentment evidently not felt by the same community at large.

As medical courses are now prescribed in our colleges, there is call for nothing more than ordinary ability to fill all requirements. In dental practice that much knowledge is useful, if not necessary. Assuredly nothing less than is required by the ordinary medical college is enough to enable one to practice dentistry as it should be.

In any specialty of medicine or surgery, the pupil is ground in foundations before the special matter receives attention.

The dental student in his college course acquires, to be sure, an indefinite amount of knowledge, termed the principles of medicine and surgery.

That this amount is insufficient is clearly shown by the floundering and wild-shot discussions which frequently characterize dental meetings when a purely scientific question is under discussion.

There are some distinguished exceptions to this, but they are all students out of college! Men like these receive recognition anywhere and everywhere, through their personal attainments, not by any means through the force of a D.D.S.

Excluded as specialists, as practitioners of a distinct profession, and in the main above artisans, our D.D.S. occupies an anomalous position. While in exceptional cases he may be a specialist or an artist, the body of dentists are found *in medias res*.

Why is this? Granting the reasoning here to be correct, is it not because of an insufficiency of foundation?

Among the recognized professions, dentistry is more closely associated with surgery and medicine than with any other.

The only bar to its direct identity as a specialty of surgery is lack of basal study. So long as we must see in the body of dental practitioners a class of insufficiently educated followers of a branch of surgery, just so long do we call ourselves "a stranger."

As the matter stands to-day, we are "dentists,"—either that or only mechanics.

No amount of discussion or disputation can remove us from such position, until by superior attainments that is secured for what is now striven in vain.

Now, all discussion is virtually idle.

Raise the primary standard, and the problem solves itself.

Give to medicine or surgery some contributions equivalent to what

we receive from them, and appreciation of our manifest virtues is assured.

There is no reason why the greatest manual dexterity should not be, with scientific knowledge, a common possession of the "dentist." Of this much the leaders of dental practice are justly confident; their calling, having whatever status it may, is one in which no scientific attainments are too great to be applied, and is one which acquires more dignity and value with the lapse of time.

In nothing is individuality so marked.

That is, "dentistry" is to-day what each makes of it by his personal knowledge and skill.

As a thing itself, it is nondescript.

DISCRIMINATION IN THE USE OF FILLING-MATERIALS.

BY DR. CHARLES F. ALLAN, NEWBURGH, N. Y.

(Read before the Second District Dental Society at Newburgh, N. Y., October 9, 1893.)

PROBABLY no subject could come up before us for discussion that bears more practically on the results of our every-day practice than that which I have named to talk to you upon to-day; but I want to premise, and possibly to disarm, some criticism by saying that I appreciate the fact that my subject is altogether too great for any exhaustive treatment in the short time at my disposal, and that, indeed, to treat it exhaustively would be to go over with you much of the theory and practice of our treatment of caries, which means, as you all know, nine-tenths of our professional work. This is not my intention. I mean only to scratch the surface, more possibly to invite question and discussion than to elaborate ideas original with myself. Indeed, it is difficult for the professional man, especially the dentist, with the thousands of teeming brains continually at work devising new methods and working up new materials, to be original, and I fancy that man is the most usefully so who keeps most fully abreast of the new thought of his day, and works up continually the new ideas and schemes of others for the benefit of his own patients.

This means eclecticism in practice. It means, as I want to put it to you, that in general terms there is a place in every dentist's practice for the use of all the materials that are furnished us for the filling of cavities in teeth, and that, other things being equal, he is the best dentist who knows best the qualities of the different materials in his cabinet, and uses them with the best discrimination for the saving of teeth.

At a time antedating my own practice, but possibly not before that of some of my hearers, dentists were denied admission to, and sometimes expelled from, dental societies because they used amalgam; and a very prominent professor, possibly the most prominent teacher in our dental colleges, put himself on record with the extraordinary dictum that "any cavity that was worth filling at all was worth filling with gold." Ergo, gold was the only good filling-material.

Now, I want to say to you in this connection, that when you hear a dentist say he *never* uses a certain material, that he *always* does this and *never* does that, it is safe to doubt either that person's pro-

bity or his ability. He is of the few, most likely, who *never* have failures.

The good dentist uses *all* the means and materials at his disposal. He finds them insufficient enough, and is continually wishing for more and something still better.

The ideal filling-material has never been discovered, and possibly never will be; but to meet varying conditions and wants, many materials other than gold have been brought to our notice, differing in what we may call adaptability, for want of a better term, and differing also radically from gold in working qualities. It is in regard to our choice of filling-materials, having reference, as above, to "adaptability" and "working qualities," that I want to call your attention.

By adaptability I mean that inherent relation between tooth-tissue and filling-material which would indicate what filling was best for the preservation of the tooth without reference to physical difficulties of insertion.

By working qualities I have reference to the just-mentioned "difficulties of insertion," and the expression has its main signification to us in noting the often great difficulties in the proper use of gold, as opposed to the easier manipulation of other materials.

Gold is the best filling-material. This as a broad general statement most of you will subscribe to; but, like many another generalization, it is meaningless, and is at best only a half-truth. Unless the statement were dissected and explained, and the very numerous exceptions noted, it would very often convey an untruth.

Gold is difficult and tedious of insertion, and its manner of introduction by the use of pressure and percussion is trying on the patient to such an extent that the inherent difficulties for large operations will frequently prevent its use. Gold in these cases may meet the claims of adaptability, and yet we are prevented from using it by fear of the physical and mental strain upon our patients.

Very frequently the question is, not what is simply best from the standpoint of adaptability, but what is best considering the physical or mental infirmities of our patient. I would very rarely use gold in the teeth of children younger than ten years of age, and not very often in children of less than twelve or thirteen. It is very seldom that the teeth of young children are of dense and good enough structure to warrant its use, and occasionally when we feel that as regards adaptability it is right, we are interdicted by the serious strain, mental more than physical, we would impose on young constitutions.

Specialists we are indeed, but I hope in a broad sense. Very often we are called upon to temporize with some particularly bad tooth, for the sake of keeping a child's confidence and avoiding a child's dread of our profession. In a word, we are to temporize and postpone what is best for an individual tooth, that we may in the end save all the teeth.

There is no better practice than this, however much sticklers for the best in all cases and extremists may exclaim.

Amalgams have a vast field of usefulness, though I think they are used much oftener than they should be, and very rarely with that care and attention to details necessary to accomplish the best results. No material calls for more careful management.

Slovenly work invariably brings about bad results, and the material has had to bear more of the odium consequent upon faulty and reckless manipulation and lack of knowledge than any other material we are called upon to use. Employ it in its proper place, and with judgment and care in its insertion, and it will make a good record for you as a tooth-saver.

I have said that it is used much too often ; this is my firm belief. With teeth of reasonably good structure in people who take care of their teeth, and who are willing and anxious to have the best work done, and have the physical stamina to stand the necessary strain, gold is the best material for approximal and crown work in the bicuspid and molar teeth, and it is a wrong impression, frequently held, that such work done with amalgam will last better than gold. In a general way, the cases where I would use amalgam are as follows, and I will take my first class of cases from the opposite to what I have indicated for gold,—viz : where the physical strength to stand the necessary strain is lacking. Cases of physical and mental debility are continually coming under our charge where we would either not be allowed to use gold or where we would err from constitutional reasons.

Though adaptability says gold, necessity says amalgam.

In back teeth of very bad structure, with cavities working well up under the gum, especially if there are old gold fillings that have failed, I would use amalgam, and where it is possible I would have the amalgam join on to a gold filling. In the small crown cavities of the temporary molars, I know of no better material than amalgam, and I would likewise use it very frequently for crown cavities in the first and second molars of children under twelve or thirteen. How amalgam should be used is hardly germane to this paper, though I would say that in the majority of cases I would use it in connection with one of the oxyphosphates.

By the use of the word amalgam, so far, I have meant the material ordinarily so called, and have not included copper amalgam ; but I now wish to speak of this latter article, and to declare that even this certainly much-blackened and even maligned material has a place and a use, and that when used in its proper place it is very valuable. I have seen young patients within this month with copper-amalgam fillings of my own insertion, whose mouths have been to me a delight to look upon,—children with fragile, chalky teeth, with copper-amalgam fillings in the buccal and lingual aspects of the lower molars, black as ink, but absolutely perfect in their integrity. I am free to admit that, on the whole, my experience with copper amalgam has been a disappointment, and in some ways a bitter one, and that my sanguine anticipations, born of a contagious enthusiasm, have not been fulfilled. Nevertheless, there is a place for it among our tooth-saving materials.

I would rarely ever use it either in crown or approximal cavities, with the exception of the lower third molars. Occasionally, where these teeth are impacted in the petrous bone of the angle of the jaw, only half erupted and more than half decayed, with an operculum of gum covering half or more of the crown, to my mind there is no other filling half as good.

I would also use it in the lower molars of children where they are of very poor structure, with cavities on the buccal or lingual faces.

Another very excellent place for it is in repairing the damage done to a molar by an ill-fitting cap used as an abutment for a bridge.

Generally speaking, it should never be used where it will be exposed to attrition, and it is of most use where all other filling-materials are ineffective. I can but think that there is much of promise in copper amalgam; that as yet we know but little of it, and that some day, with a modification of composition and preparation, it will yet come forward to fulfill our early expectations.

Gutta-percha, of various grades, high heat and low heat, and also the base-plate pink gutta-percha, are of the greatest value; but the material is used so generally, its merits are so commonly recognized, and there is so little difference among dentists as to its value and as to its position among filling-materials, that I will not waste your time discoursing of its merits. One use, however, of the pink gutta-percha I feel like noting, and that is its great value in that peculiar and unfortunate class of cases that occasionally come to us,—always of course from some other dentist,—where the teeth of young persons have been under the influence of regulating apparatus for some months, or possibly years, and are in effect melting away with white decay. Gold and ordinary amalgam are almost useless to even moderately retard the destruction, but pink gutta-percha, supplemented perhaps with copper amalgam for the back teeth in some of the worst cases, will help to tide over the evil day till time brings to our aid constitutional recuperative powers. Just as we have seen molar crowns, used as abutments for bridge-work and covered with ill-fitting caps, waste and melt and practically come away with the caps, so do we see in some cases the same melting, wasting process taking place after long-continued regulating work,—the teeth straightened only to be destroyed. Do not for a minute take this to mean a condemnation by me, wholesale or otherwise, of regulating, for this is far from any purpose of this paper. "It is a condition, not a theory, that confronts us." Regulating work is but too often carried to an extreme, is ill advised and ill carried out, and the teeth come to us for treatment. No sadder cases come to the dentist, and I am glad that we have in pink gutta-percha such a valuable aid.

The class of cements known generally as oxyphosphates or oxychlorids have a very wide field of usefulness, though confined mainly by me to use as a substratum for gold or amalgam fillings. Oxychlorids have a special value with many operators as a temporary stopping for the purpose of relieving the often extreme pain of sensitive dentine, rendering its further and permanent excavation less painful. It is also used frequently for root-filling, and by many it is thought to have great value for that purpose. In my own practice I seldom use the oxychlorids, though they always have a place in my cabinet.

Oxyphosphates, though, are a very necessary part of my equipment.

It seems to me rarely wise to put in a very large gold or amalgam filling without first filling the cavity partially with oxyphosphate.

It is invaluable, in the first instance, to control thermal shocks where gold is used; in the second place, it is invaluable by reason of its adaptability over a thin layer of dentine covering a nearly exposed pulp; and in the third place, it is of value because it restricts the amount of metal filling necessary.

The greater the amount of metal you have in a filling, the greater will be its expansion and contraction as a consequence of thermal changes. This point is one not often referred to, but it is a very practical one, and is a factor important enough to be seriously considered, for it involves in many cases the future integrity of the most painfully and carefully constructed work. Of course when the metal filling is gold, the great saving of labor and time in the putting in of the filling is a matter of the most serious importance, and renders work possible to the patient in some cases where for physical reasons it would otherwise be impossible. In its use in connection with amalgam, a great point is gained in the avoidance of discoloration of the tooth.

Substantially the only cases where I would use oxyphosphate by itself would be with middle-aged or elderly people, either in front or back teeth, where the teeth are wide apart, and where for reason the work must be of a temporary nature. I would also use it occasionally with the temporary teeth of children. To my mind, it is a material that should be only used as a filling by itself where all surfaces of the filling are widely exposed, and it should never be used in approximal cavities of teeth close together.

The various kinds of oxyphosphates differ in their qualities, and the same preparation differs with different packages and at different times, so that there is always an element of uncertainty inherent in the material, which necessarily militates against its use as a filling to be depended upon by itself.

Perhaps a class of cases calling for discrimination more than any other is that of eroded teeth, as seen generally in the mouths of middle-aged and elderly people, though this discrimination is frequently to be shown more in deciding as to whether the teeth are to be filled at all than as to the kind of filling; but as this would open a side issue, I will drop it with the mentioning.

Generally speaking, with male patients such erosions can best be filled with gold. The moustache helps to hide the glitter of the gold, and the filling is, as a rule, much easier put in than an inlay.

With our female patients though, especially where they are moderately young, and show their teeth and gums a great deal, an inlay, either of porcelain cut from a porcelain tooth or of glass-filling, will give a satisfaction to patient and operator that will amply pay you for any increased time and trouble you cannot charge for in money.

The glass-filling outfit, however, is as yet very unsatisfactory. The glass in the tubes as furnished us bears no resemblance in color to the color indicated, and when you have moderately well matched the color of your teeth, you have no cement of the right color to cement it in with. Cutting an inlay out of a porcelain tooth is very slow, tedious work, but it often gives great satisfaction, especially if cut from an English tooth, which will allow of the inlay being polished after it is inserted. Occasionally the porcelain rods of Ash & Sons can be cut and inserted to great advantage, also the inlays made by The S. S. White Dental Manufacturing Company. The latter, however, cannot be polished.

Another class of cases where discrimination can be shown in favor of porcelain as against gold is that of broken front teeth. There is hardly a fracture of the cutting-edge of the superior incisors and

cuspsids of importance enough to be filled at all, but what can be repaired by porcelain. This possibly may seem to some of you a strong statement, but it can readily be verified. To my mind, nothing is more inartistic, no class of work is a more glaring reproach to the esthetic side of our professional life, than the frequent, almost constant displays of gold that we see in the mouths of otherwise good-looking people. In many cases such displays are unavoidable, but in very many cases they are obtruded, and in all cases they are unfortunate.

This has been a very cursory and incomplete treatment of my subject. An essay much longer could easily be taken up with any one branch of it, and still not be exhaustive; but I have tried to group together salient points,—all, I think, practical ones, and some of which I hope will be elaborated and possibly criticised more fully in the future.

I cannot be mistaken in thinking the subject interesting, for I know it is vital, however much I may be lacking in my treatment.

DENTITION A CAUSE OF DISEASE.

BY DR. C. S. BUTLER, BUFFALO, N. Y.

(Read before the Eighth Union Convention of the Sixth, Seventh, and Eighth District Dental Societies of New York.)

DENTITION, although a purely physiological process, is nevertheless almost always attended with some degree of suffering. For this reason teething has been considered by the medical profession, from the days of Hippocrates, Galen, and Celsus, a potent factor in the cause of disease; and while there seems to be less unanimity on the subject now than formerly, yet the etiology of dentition still holds a strong position within the domain of physical diagnosis, and is receiving more than ordinary consideration at the hands of writers upon infantile pathology.

Down to within a very few years teething was almost universally regarded, both by the medical profession and laity, as causing nearly, if not quite all the diseases of infancy, and there are still many able writers and practitioners holding this view; while others, equally able, believe the diseases of this period coincident with, and not dependent in any sense upon, the teething process. They tell us that, with the great advance in the past few years in the knowledge of the diseases of infancy, "teething has been pushed into the background, until it now occupies a very insignificant position in the etiology of disease."

Midway between these two extremes there is to be found a large, and we believe constantly increasing, class of equally able writers and practitioners who, while admitting that heretofore teething has been held accountable for by far too many infantile diseases, believe, nevertheless, that there are many directly traceable to, or caused by, painful evolutions of the teeth. To this middle class we, as dentists, rightfully belong; for the part which dentition bears in the causation of disease is not yet fully determined, but opens up a field for investigation and study, which if energetically pursued, the results, I doubt

not, will enable us the more worthily to maintain the position so universally accorded us among the learned professions of the world.

To the progressive mind fields proper for investigation and research are constantly opening, and it is the boast of our profession that so many of its members are reaching out into hitherto unexplored fields within the domain of pathological science.

Dentition a cause of disease, is therefore a subject especially within our sphere, and to him who shall bestow upon it study sufficient to clear away the doubts and mysteries now surrounding it will come the consciousness of having removed one of the greatest dangers threatening the infant life, by making possible a correct diagnosis and treatment of many infantile diseases now but imperfectly understood.

At present the best authorities on dental pathology are at variance on this subject. Those who charge teething with being the cause of the most varied disorders of infancy, neglect or entirely disregard serious affections both in contiguous and remote organs; while those holding the opinion that dentition, being a purely physiological process, cannot therefore give rise to any morbid phenomena, err equally, though in the opposite direction.

An early recognition and appreciation of the fact "that difficult and painful evolution of the teeth frequently causes derangements in the functions of organs, even those remote from the mouth, and sometimes produce in them a real pathological state,"* will lead not infrequently to a more intelligent treatment of grave and serious affections. In estimating the amount of influence dentition may have in the causation of disease, a clear understanding of the changes taking place in the teeth and adjacent parts is required,—and not in these only, for there are also changes going on at the same time in other and more remote organs, the influences of which have a marked bearing upon the teething process.

The infant body is not an adult organism in miniature. All its organs are incompletely developed, but not uniformly so; while the whole system is characterized by peculiarity of structure and function. The preponderance of the spinal nervous system is especially marked, and it is owing to this fact that the sympathy of distant organs with one another is much greater in infancy than in adult life, and produces in them a special tendency to reflex nervous disturbances.

It is a matter of common observation that the least functional disorders may excite serious and profound disturbances in infancy, the influence of which would not be felt in childhood or adult life; as, for example, a slight irritation of the larynx may produce spasmodic coughing, a little undigested food cause convulsions, while almost any excitement results in vomiting. "Thus a mere interference with the normal functions of the infant may and often does result in consequences out of all seeming proportion to the gravity of the cause."

The teeth belong not to the osseous but to the dermal system. Their relations to the nervous system are therefore especially indicated, and are in early infancy made up largely of neurotic tissue. They take their rise in the epithelial membrane covering the maxilla, where as early as the fourteenth week of intra-uterine life preparations for the formation of the deciduous teeth are discernible in the devel-

* J. Lewis Smith, M.D., "Diseases of Infancy and Childhood," page 571.

opment on the edge of the maxilla of a closed follicle, from the floor of which a papilla projects. These papillary structures are highly vascular, and are filled with numerous nerves and capillaries.

From the seventeenth week of foetal life on, they begin to assume the character of the future teeth by the deposition of the lime-salts into the previously prepared tissues, till about the fortieth week, or at birth, when the incisor crowns are fully formed and the cuspids and molars well under way. At or about the twentieth week of foetal life preparations are also making for the development of the four first permanent molars, by the same process of budding from the underlying embryonic tissue, as in the case of the deciduous teeth. Following closely upon this is also the inflection giving rise to the germs of the twenty anterior permanent teeth, and from this time on they are passing through the several stages preparatory to receiving the salts of lime ; so that at birth the infant has not only the twenty deciduous teeth well advanced toward calcification, but has also the germs of twenty-four permanent teeth, in twelve of which calcification begins during the first year.

Bearing in mind the fact that the development of the dentine and enamel is preceded by the formation of the soft tissues or tooth-germ, equal in size and of the same form as the future tooth-crown, and that these soft tissues are vascular and filled with nerves and capillaries, and that calcification by the dentine is from the periphery of the papilla inward till the germ remains a mere bundle of nerve-fibers,—the pulp of the fully developed tooth,—while the gradually elongating crown presses against the enamel-organ and roof of the dental sac until they disappear together with the superimposed gum-tissue ; bearing in mind, I say, these delicate processes of nature, may they not upon the slightest functional derangement take on true pathological conditions? I think this question may be answered in the affirmative, and certainly it may if the accumulated experience of nearly all the best-known writers upon infantile pathology is to be given the weight it is seemingly entitled to.

It should be remembered also that the period during which the teeth and surrounding tissues are undergoing these changes is one of augmented nervo-vascular action, and the whole organism of the child is consequently more liable to a disturbance of harmony. Its nervous system has not yet acquired the stability and equilibrium of the youth, but is extremely susceptible to impressions, while the brain, the stomach, and intestinal tract, the circulatory and respiratory apparatus, show an increased though varying liability to irritation.

This is shown by the marked manifestations of disturbed functions that are produced by what in the more mature system would be unnoticed. It is shown also in increasing the nervous impressibility of the child, and thus lessening its powers to resist perturbing influences ; for, as Dr. J. W. White, in his article on " Diseases Incident to the First Dentition," in the *American System of Dentistry*, truly says, " The natural vigor, the state of the general health, and the conditions by which the child is surrounded exert a powerful influence in preventing or promoting aberrations in dental evolutions."

What may be termed normal dentition depends upon an absolute accord between the processes of growth and absorption, as well of the papilla as of the membranes covering the developing tooth. The

gradual lengthening of the roots causes the teeth to rise in their sockets, thereby producing constant pressure upon the overlying tissues, which, becoming thinner and thinner, finally allow the teeth to escape.

When from any cause there is a want of accord between the propulsive and the resistive forces, they are in antagonism ; or when from any cause the advance of the tooth is more rapid than the removal by absorption of the superimposed tissues, they become an obstacle, and the tooth acts as a mechanical irritant. Congestion, induration, tumefaction, and ulceration are the result.

By many there is thought to be some force, in addition to or independent of the elongation of the root, in impelling the tooth-crown forward. Speaking on this point, Tomes in his "Dental Anatomy," page 191, says, "Very strong objections have been brought forward clearly proving that this cause (elongation of the root) is quite inadequate to explain all that may be observed.

"In the first place, teeth with very stunted roots, or practically no roots at all, are often erupted. Again, the tooth may have the whole length of its roots completed, and yet remain buried in the jaw through half a life-time and then erupt. Moreover, when a healthy normal tooth is erupted, the distance traveled by the crown materially exceeds the amount of addition to the length of its roots which has taken place during the same time." Speaking upon this same subject in his "Comparative Anatomy," Mr. Tomes further says, "The tooth of a crocodile moves upward, tooth-pulp and all, obviously impelled by something different from mere elongation, and my own researches upon the development and succession of reptilian teeth clearly show that a force quite independent of increase in length shifts their position and erupts successive teeth. But what the exact nature of the impulse may be is an unsolved riddle ; the explanations which I have read bring to my mind less satisfaction than the admission that we don't know."

Here, then, is a force sufficient oftentimes to propel teeth long distances from their normal position, which the most intelligent investigators admit they do not understand. Is it safe to assume that a force so powerful and so persistent, even though physiological, is incapable of producing profound and serious disturbances ?

With some children, tooth after tooth appears without the slightest premonitory symptoms. The period of dentition comes and goes, attracting attention only when a new tooth is discovered, but as Tomes again remarks, "Instances of teething such as these are comparatively rare, and can only occur in children who are and have been perfectly healthy, which involves a series of conditions our artificial state of living does not tend to bring about, even if it can allow."

It is sometimes urged, by those claiming dentition has little or no influence in the causation of disease, that teething cannot produce special discomfort because of the comparative insensibility of gum-tissue. Yet it is a well-known clinical fact that notwithstanding its comparative insensibility in normality, in a state of inflammation gum-tissue becomes one of the most sensitive of the whole system. But it is obviously unfair to limit the influences of teething to the tissues by which they are immediately surrounded. "The period of dentition, like that of puberty, constitutes one of the great epochs of life ;

it is a time when great changes are going on in the whole organism, when the animal machine being in a state of increased activity, its parts are more than usually apt to get out of order. . . .

"The error which has been committed with reference to this matter, not merely by the laity but by members of the medical profession also, consists not in overstating the hazard of the time when changes so important are being accomplished, but in regarding only one of the manifestations—though that indeed not the striking one—of the many important ends which nature is then laboring to bring about. The epoch of dentition is to be looked upon just in the same way as that in which we regard puberty. Constitutional disturbances are more common and serious diseases more frequent at these times than at any other; but their causes lie deeper than the tooth which irritates the gum it has not yet pierced, in the one case, or than the womb which has not yet yielded the due discharge of blood, in the other."*

The complex association of tissues immediately surrounding the teeth, their diversified physiological functions and significant systemic relations, suggest pathological possibilities to be found nowhere else in the human body.

By means of the lining mucous membrane of the mouth the teeth are related by continuity with the pharynx, œsophagus, stomach and intestinal tract, the larynx, trachea and bronchi, and by contiguity as well as continuity with the eyes, ears, nose, and antra; and by means of the terminal distribution in and about the mouth of the sensory and motor branches of the trigeminus and their association with the great sympathetic nerve, the teeth are connected with the entire organism. It should also be remembered that the fifth is the largest of all the cranial nerves, and is the sensitive nerve of the head and face, the nutrient nerve of the teeth, and the motor nerve of the muscles of mastication, and by division and subdivision supplies branches to the eye and eyelids, the nose, the ear, the forehead and scalp, the upper and lower teeth, the gums and tongue, as well as to the muscles of the face; while its numerous ganglia and frequent communications with the sympathetic nervous system render possible the most formidable disturbances, when from any cause there is an interference with the eruptive process. Therefore, anatomically considered, the pathological bearings of deranged functions connected with the teeth cannot be easily defined nor limited.

What, then, are some of the diseases upon which dentition may be said to have an influence?

One of the most common results of difficult and painful evolutions of the teeth is a general febrile condition, marked by restlessness, irritability, and rise in temperature. Of this condition, Hunter, in his admirable work on "The Teeth and Disorders arising from their Painful Evolution," says, "The fever is sometimes slight and sometimes violent. It is very remarkable, both for its sudden rise and declension, and is probably caused by a disordered nervous system."

With many infants the fever comes and goes with the cutting of each tooth, so that there is no doubt in the minds of the best authors that it is a direct result of dental irritation. Diarrhœa is also an

* Dr. West, "Reference Hand-Book of Medical Science."

extremely prevalent disorder incident to dentition, attacks of which will come on as each group of teeth appear and pass away in the interval. Sometimes, however, from long continuance of the disease, the child passes into a state of marasmus. The diarrhœa not infrequently precedes the appearance of the teeth, and may occur without any turgescence of the gums or other signs of local disturbances. It is therefore unsafe to assume, in the absence of such local symptoms, that dentition is in no sense involved.

Eustace Smith, in his "Wasting Diseases of Children," says, "Many infants are said always to get their teeth with diarrhœa, and there is no doubt that during the cutting of the teeth the bowels generally are in a state of irritability, for we know that during the period of dentition the follicular apparatus of the intestines is undergoing constant development, and is therefore especially liable to inflammation. This is seen in the follicular stomatitis and enteritis so common when the buccal and intestinal follicles are in a state of rapid growth." At the time of getting the teeth, the infant has ceased to depend entirely upon the mother's milk. Its digestive apparatus on this account is apt to be the more easily disarranged. The diet may be strictly suitable for an infant in good health, though it by no means follows that the same regimen will be found appropriate at a time when the febrile irritation set up by the developing teeth has reduced its digestive powers. The whole intestinal tract at such a time is in a state of exalted sensibility, and while the evolution of the teeth is a purely physiological process, it is, nevertheless, a powerful predisposing cause of diarrhœa and enteritis, and is so recognized by many of the most able writers and observers of the day and by most practitioners.

Infant malnutrition constitutes another very common disorder, sometimes attributed to dentition, and the weakness which it invariably induces renders the child less able to resist perturbing influences to which it may be exposed. When in this condition the cutting of the teeth may produce a distinctly injurious effect upon the intestinal derangement. Indeed, cases are sometimes met with which persistently resist all treatment until the teething process comes to an end. Obstinate vomiting, spasmodic coughing, etc., having refused to yield to treatment, cease suddenly upon a group of teeth penetrating the alveolus and gum. Clonic or intestinal convulsions, a disease not common in this country, is most prevalent during the period of dentition, and writers generally believe dental irritation to be a direct cause of the convulsions by rendering the nervous system more impenetrable.

Dr. J. Lewis Smith mentions a case clearly showing the truth of this belief, and says that the effect of dentition is especially observable in weakly children when several dental follicles are undergoing active evolution at the same time. In the case cited, five teeth pierced the gums in the course of two weeks, after which no convulsive attacks occurred. Barron attributes these attacks in teething infants to the excitement of the nervous system arising from the pain which is felt in the gums and a determination of blood to the dental apparatus, in which afflux the whole vascular system of the head participates. Instances where the convulsions are due entirely to dental irritation—or if there are other causes they are quite subordi-

nate—are cited in substantiation of the belief that affections referable to the cerebro-spinal system are among the commonest results of pathological dentition.

Epileptiform convulsions, dependent upon the eruption of the deciduous teeth, are far from uncommon, and "in some cases," says Tomes, "where partially erupted temporary teeth have appeared to be causes of irritation, medical men—all other remedies having failed—have in several instances extracted them with the effect of at once relieving the convulsions."

Portal says, in his "Observations on Epilepsy," "The extraction of sound teeth—all other means having failed—at once arrested the convulsions;" while in the *DENTAL COSMOS*, vol. xii, page 211, is mentioned a case where the patient was in a state of collapse, recovering after extraction. Drs. Coleman and Baly, in the *British Journal of Dental Science* for 1863, mention cases in which epilepsy was apparently cured by the extraction of carious teeth, while the experiments of Dr. Brown-Sequard on lower animals lead, as he says, inevitably to the conclusion that epileptiform convulsions may arise from dental irritation.

Infantile paralysis is also classed among the diseases incident to dentition; and in the *Lancet* for February 28, 1860, Dr. Brown-Sequard speaks of a case of paraplegia in which the paralysis appeared at the very beginning of the second dentition, and increased and decreased alternately at the time of and after the cutting of each of the three molars. Dr. Fliess, in the "Journal for Sick Children," says, "When a child during the first or second dentition is suddenly seized with paralysis in one arm, or of the whole side of the body, or is affected in only a part of the same, without any obvious external cause, this is to be considered as a paralysis from dentition, and an accurate examination of the mouth will confirm this diagnosis, for the teeth will be found firmly compressed within the gums."

Tetanus is also mentioned by Brubaker and others as among the possible diseases attributable to dentition, it being due to an abnormal excitability of the motor functions of the spinal cord and an increase in reflex activity, a condition readily produced by injuries to the dental nerves.* Tetany may be described as a functional neurosis, manifested by tonic spasms, particularly of the extremities, and an increase of mechanical and electrical excitability of peripheral nerves. It is considered by Herz to be due to spinal anemia, while Jacobi on the contrary attributes it to meningeal hyperemia, and Gowers explains it on the hypothesis of a primary lesion in the primary cells of the cerebro-spinal tract.

Post-operative tetany may supervene almost immediately after the effect of the anesthetic has disappeared, or may be delayed from one to ten days. Unlike tetanus, it is rarely accompanied by septic conditions.

Secondary and direct affections of the eye are recognized by all

*What is here regarded by Brubaker and others as "tetanus" is undoubtedly the "tetany" of Corvisart, Trousseau, Erb, and Chvostek. The two diseases are not merely similar in name, but present many characteristics which frequently lead to mistaking one for the other. There is, however, a wide etiological difference between them, though both occur as sequence of operative interference.

our best oculists as being due sometimes to dental irritation, and Samelshon mentions a case of periostitis of the orbital cavity in a child two weeks old. The disease, which was accompanied by enormous protrusion of the eyeball, was caused by the premature eruption of the first deciduous molar, after whose extraction the affection ran a favorable course.

That aural troubles are produced through reflex irritation of the dental nerve, is a truth no longer questioned, and the fact has become so apparent as to be well recognized by aural surgeons everywhere. Chronic catarrhal inflammation of the dermoid meatus during teething, otorrhea, acute inflammation of the middle ear either of the catarrhal or purulent form, and otalgia, are often due directly to dentition, and many cases are reported by Brubaker and other authors to substantiate the statement.

Insanity is also said to be due sometimes to dental irritation, and Esquival, who was the first to point it out, says, "Among subjects of lymphatic and nervous temperament, the pains of the first dentition sometimes become the cause of insanity." And so with chorea, hysteria, and the many visceral disorders, occurrences of which are sufficiently frequent during the teething epoch to lead our best writers on infantile pathology to class them as incident to dentition.

Here, then, we have on the highest authority a long list of the many ailments that may be consequent upon disordered dentition.

Just how this occurs in some instances it is difficult to determine; but it has been thoroughly established that dental irritation may induce pathological conditions in other organs of the body, or in the nervous structures themselves, even without the existence of any subjective intimations of pain in the teeth, and it is therefore necessary for the practitioner to distinguish in each individual case whether the disorder is consequent upon some derangement of the teething process, or upon an abnormal condition of some other organ or organs, of which the dental difficulty itself is but a symptom.

The clinical examination of infants and young children cannot be successfully practiced by the methods employed in the case of adults. The truth of this statement will be assented to by all who will reflect for a moment upon the great difference in the expression of the various organs in infancy and adult life. The predisposition of the infant is to disease, and owing to the preponderance of the nervous over the physical system it is universally conceded that a shock is much greater to an infant than to an adult, and consequently severe operations are never performed upon young children except to save life, but are usually deferred until dentition is completed.

There are those, says Dr. Berg, who believe dentition cannot be productive of any serious pathological disturbances, but they are not right in the minority. When it shall have been proven that other physiological processes, like puberty and the cessation of the menstrual flow, are never productive of serious morbid states, then we shall give credence to such a view; for the present it is emphatically the opinion of the vast majority of authorities that teething is frequently the only assignable cause of some of the diseases occurring during the dentitional epoch.

CORRESPONDENCE.

DENTAL EDUCATION OF THE PUBLIC.

TO THE EDITOR OF THE DENTAL COSMOS :

Sir,—The subject of educating the people in dentistry certainly must suggest itself daily to every dentist.

True, we often get opportunities to personally explain certain points of interest to fit the special case in hand at the time, but think how often these explanations have to be repeated. Must every conscientious dentist go over a certain list of points to every patient that comes under his care?

To properly care for the teeth it is essential that every person should understand certain rudimentary points, so that they will secure the advantage of having small cavities filled instead of waiting until the pulp is exposed, or the tooth dead and ulcerated to such an extent that they can no longer stand the pain. About ninety per cent. of this latter class, when they are compelled to call for dental services, will say, "I would like to get a tooth pulled." What dentist does not have from one to half a dozen just such cases every day? Now, what is to be done?

Did you ever stop to think how differently such cases are handled by different dentists? Suppose the case to be that of a person in moderate circumstances (of course ignorant of the care and value of the teeth), patient a stranger to the dentist called upon, and the tooth in question a valuable one but with pulp dead or dying.

One class of dentists will say the tooth should be treated and saved, and positively refuse to extract it. Another class will say the tooth can be saved, and certainly should be, but will extract it if so requested. Another class will say it can and should be saved, will explain how and why, and about what the expense would be, and spend some time in explaining how much easier, better, and cheaper the tooth could have been repaired a few months before : thereby teaching them how to care for the others before they reach the condition of this one. But think of the time this conscientious dentist spends in the discharge of his duty. And perhaps after a half-hour's pleading, the patient will say, "Oh, pull it out ; I don't want to be bothered with the thing any longer." In such a case his time is absolutely lost. He extracts the tooth, and is really glad at heart to think he does not have the filthy thing to bother with, and his conscience is easy.

But a large majority of the above class of patients will have such a tooth saved if talked to in this manner, and it therefore keeps these dentists busy about half of their time filling dead teeth, which all know is not the most desirable work in dentistry. Certainly every dentist belonging to this class would hail with joy any practical proposition to educate the people, so as to reduce the above-mentioned operations to as small a per cent. as possible.

And this very point is the secret of saving all the teeth, for almost every person in the land, easily and cheaply. Simply educate in a brief and easy way every person who will be educated, and nine-tenths of the tedious operations, to say nothing of the pain, loss of time, and health of the patient, will vanish.

Another class, and I am afraid they are not few, when the patient above named says, "I would like to have a tooth pulled," extracts it at once. He knows that the tooth should be saved, and knows that he is perfectly competent to save it. But he has a good paying practice, and his time is valuable; he has none to waste. By the appearance of the patient, he judges that he probably could not afford to pay him for the time it would be necessary to spend upon the tooth to properly restore it, and it is an undesirable operation at best, so he extracts the tooth without a word of advice. The dentist reasons with his conscience in this way: As the patient has been so negligent as to allow the tooth to get in this condition, he deserves to lose it; he probably would not appreciate the work if I did save it for him, and perhaps, after the work is nicely done, would even criticise me to his friends for having advised him to spend so much time and money just for one tooth.

There is still another class who will fill the easy cavities, and assure the patient that the teeth with large cavities, and the dead teeth, are past repair, and as soon as they make trouble they should be extracted, notwithstanding that the patient is perfectly willing and anxious to have them all repaired.

Of course our dental laws will remove this evil, when the present crop of this class will be so kind as to die off. But until then, think of the thousands of valuable teeth that will be lost simply because the people are not aware of the fact that ninety-nine per cent. of all the teeth can be practically saved. And more especially something should be done, now that the local anesthetic era is upon us.

Almost all the dental information that the public have access to, aside from personal questionings of their dentists, is written about in this style:

"PAINLESS DENTISTRY.

"Have your teeth extracted without pain by the new process. Dr. — has the exclusive right to use — for this section. By the use of — no pain, no swelling, no sloughing, no danger, no bad after-effects, etc."

By such literature many worthy people are led to believe that painless extracting is the height of the dentist's ambition, and as they are ignorant regarding the many practical methods of saving their teeth, have them all extracted.

One such "painless dentist" can destroy more teeth than a dozen conscientious dentists can save, and still we sit by and allow it to go on without the scratch of a pen to tell the people their best course to pursue, with comprehensive reasons why and when to pursue it.

At present, if an individual dentist should take steps toward publishing, in any way, information concerning the care and restoration of the teeth, he would be looked upon as taking an undue advantage of his fellow-practitioners, and perhaps be brought before his society as a violator of the code of ethics.

Now, what are the objections to a plan as follows? Let one of the leading dental societies, or the editor of a dental journal, ask for brief and practical contributions from every dentist in the country concerning the value of the teeth, their structure, how they are liable to be destroyed, and the various ways of restoring diseased teeth to usefulness, etc. If possible, to allay the people's unduly augmented

fears of the dentist and his methods, these articles should be written in a plain, comprehensive manner, to interest people possessing ordinary intelligence.

Contributions coming from all classes would give the author of a pamphlet a large field to select from. The author, or rather the compiler, would use what was suitable only, and have the privilege of making any and all alterations he saw fit. The contributor's name might be affixed to his contribution or not, as desired. Now these pamphlets are to be sold as reasonably as possible, for a free distribution, to any and every dentist who desires them, which should be every one who has the interest of the profession and the people at heart.

Another way to more thoroughly circulate the contents of the pamphlet would be as follows: Invite all the live dentists of a community to contribute to a publishing fund; select the most popular local newspaper, and publish a portion of the pamphlet fresh every week, in amounts to suit the public best, perhaps from three inches to half a column. If the pamphlet is soon exhausted, repeat until another edition is published, so as to keep valuable information constantly before the public. If the burden of expense should fall upon only a small percentage of the dentists who would be benefited, allow them the privilege of letting it be known who it is that pays the bill of advertising. By such a plan no one is injured, no one has violated the code of ethics; and on the other hand, every dentist and every sensible person who availed himself of his opportunity would be the gainer.

If the people of the community, after having such a chance to inform themselves, would not do so, and profit by the advice, we, the much-abused conscientious class of dentists, could then extract molars on request without feeling that we had robbed the patient of fifty dollars' worth of tooth-structure without an effort to save the same. By this method, previously stated, we can inform the people that our true calling in life is to save and restore the natural teeth, and not to destroy them by extracting, as so many people suppose, and that one of our main objects is to prevent and relieve pain and suffering, and not to inflict it.

If these lines are worthy of space in your columns, you are welcome to publish them.

Ask for approval or criticism from others, and see what the mind of the profession is as to the point advocated.

If the subject receives the indorsement of the leaders of the profession, and is carried out either after my plan or in some better way, I believe it would be of universal benefit to all parties, and in a great measure be the means of preventing many wrongs that are so apt to follow this newly discovered method of extracting teeth painlessly.

W. H. BALDWIN, D.D.S.

NORWALK, CONN.

[Several plans have been suggested, and many attempts with a view to the better education of the public in dental matters, but thus far little or nothing involving concerted authoritative effort. The subject is important, and we believe has a widespread interest among members of the dental profession. To the end of aiding toward a better settle-

ment of the question at issue we shall be glad to have our readers express their views upon it, either in the shape of criticism upon the plan above suggested or the presentment of a better one. This topic, elaborated at some length, will be found in the report of the First District Dental Society of New York, printed in the DENTAL COSMOS for January, 1893.—ED. DENTAL COSMOS.]

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, October 10, 1893, in the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. William Carr, in the chair.

The president introduced Dr. J. E. Grevers, of Amsterdam, Holland, and Dr. John S. Burrett, of Salto, Uruguay, and welcomed them in the name of the society.

Dr. W. W. Walker, in behalf of the executive committee, announced that the paper to be read was the same that Dr. Jackson had delivered before the World's Columbian Dental Congress in Chicago, and, inasmuch as the proceedings of the congress will not be published for several months, Dr. Jackson had been requested to repeat the reading of his paper before this society, and exhibit the casts which illustrated it.

Dr. Jackson then read his paper, entitled "Methods of Constructing Spring Appliances for Correcting Irregularities of the Teeth," which was most beautifully illustrated with many models and charts.*

Dr. Jackson. At a medical meeting a physician asked me why a dentist should not do as the physician directed, with regard to removing certain diseased temporary teeth that the physician considered should be extracted. In this particular case the dentist had refused to remove the teeth, and sent word by the patient's mother that they should not be extracted. The physician still insisted that they should be removed, and the dentist absolutely refused to remove them, although the physician never went to find out the reason for the dentist's refusal. I told him that the dentist was right. The same physician, within six months, brought his daughter of twelve or thirteen years of age to me, with the condition which is illustrated in chart 36,—with an arrested development of the second bicuspid, caused by the too early removal of the temporary molar, and this is the appliance which we used to broaden the space.

Discussion.

Dr. J. E. Grevers, Amsterdam, Holland. It is certain that regulating the teeth is a very tedious branch of our practice, and we should gladly accept any system that will help us. There are many points of interest in this paper, and I was especially pleased with the

* An abstract of Dr. Jackson's paper was printed in the DENTAL COSMOS for September, page 784.

statement that cleanliness is one of the first principles of this system. I have had the good fortune to see different systems of regulating while in this country, among them that of Dr. Case in Chicago. The thing that impresses me in regard to Dr. Jackson is that all his illustrations tend in about the same line. I would like to ask him about cases where there is a V-shaped mouth, and the lower jaw has been squared. I do not know that I have ever succeeded satisfactorily in such cases. In the upper jaw, the teeth stand much forward and form a V-shaped arch, and the lower jaw is retracted. The cases that have come to me belong to the aristocracy of Holland, and I have been much struck with their deformities.

Dr. John S. Burrett, Salto, Uruguay. I have not had much experience in regulating cases, but I have found it of advantage to use jackscrews in connection with Dr. Jackson's system. I think it a very clean and simple way. I would like to ask what Dr. Jackson would use in cases of regulating the lower teeth, and how he avails himself of spring pressure when the lower teeth occlude. The cases as he describes them appear very simple, and we may get a great deal of advantage from them. I shall adopt the system upon my return home.

Dr. A. R. Starr. I hesitate about saying anything on this subject, because I have had very little experience in regulating; but I have a little model with me to-night which illustrates some of the points Dr. Jackson brought out in his paper. It has been said that because the apparatus is so easily removed by the patient he is apt to remove it and leave it out. I have used Dr. Jackson's method to some extent in my practice during the past year or two, and because of its simplicity I have done a great deal more regulating during that time than I used to do before. Previous to that, doing no laboratory work myself, I had to have my regulating appliances made outside, and this was quite expensive. With this system, the item of expense is almost nothing, the apparatus costing very little. Because it is so easily removed, it has been said that the patients would be apt to leave the apparatus out; but I find that after they have worn it for some time, it is so light and so little in the way that they have no difficulty whatever. A few months ago, a patient came to me to have the upper incisors regulated. That was in April. I made a crib apparatus after Dr. Jackson's method, and inserted it. The patient had only worn it a short time when she was taken sick, and did not call again until just before she went to the country. I adjusted the apparatus for her, and she then told me she was going away the next day and could not go on with the treatment. I told her she might wear it a few days, and if it did not make the teeth sore she could wear it occasionally, just to keep the teeth from going back, but not to wear it if it caused much pain or much change in the position of the teeth. She went away, and returned last week, and when I saw her the previous deformity was corrected to a slightly exaggerated degree. The teeth were forced slightly beyond their normal position in the arch, and the peculiar part of it was that the two crib springs which I made to go over the molars for anchorage had broken off, and had been off for a long time, and yet the patient had been wearing the apparatus, which consisted only of the base wire of German silver and the two anterior or regulating springs, one inside and

one outside of the arch, which were held in position by gold collars on the teeth. The patient had worn this all summer, and her teeth were nicely regulated when she came back. That is rather a peculiar case.

So much for the advantages of the system. The only disadvantage I find about it, or have found so far, is that the piano-wire is so apt to rust and affect the enamel, and if you are using fine wire for springs, they will rust out and need repairing. Of course, the matter of repairing is slight also. You can put in a new spring in a very few minutes. I do this work myself now, and it saves considerable expense, but the difficulty in regard to the rusting of the wires seems almost insurmountable. Dr. Jackson says he has tried coating the apparatus with tin or gold, but has not been quite successful in preventing oxidation. You must cleanse the wires each time the patient comes in, and in some mouths it is almost impossible to get the rust off, after they have worn the plate for a number of days. If we could overcome this objection, I know of no method which could surpass that of Dr. Jackson's. I will pass around these models, and you can see the condition of the young lady's mouth before she went to the country, and when she came back.

Dr. Jackson. In regard to the question of V-shaped arch, it is not a subject that I presented in my paper, but I shall be pleased to discuss the matter very thoroughly with the gentleman if he will call upon me. It is important to first correct the cause, if possible.

If a patient comes to us suffering with a V-shaped or saddle-shaped arch, we need to trace out the cause (as I have stated previously before this society,—DENTAL COSMOS, vol. xxxii, p. 285), and know first whether it is hereditary or acquired. If acquired, it may be the result of predisposing causes or trauma. Either of the latter conditions will usually be accompanied with nasal stenosis, maldevelopment, and conditions that I will not refer to now.

If nasal stenosis is present, its cause should be removed by the specialist, to make the patient a nose-breather before the regulating is begun, especially if the arch is to be spread, for there is a great tendency for the tissues to return to their original position. These tendencies should be removed as thoroughly as possible, and after the arch is spread as described in Figs. 6 and 7 of this paper, also as published in the DENTAL COSMOS, vol. xxxiii, p. 1067 (see Fig. 13), it should be well retained, in most cases for several years.

I want to state that if the permanent teeth do not have sufficient room to erupt in a correct position, we should in most cases begin to increase the space immediately while the temporary teeth are present. The arch is increased by pressing on the teeth; the alveolar process will follow, and also the germs of the permanent teeth.

I would hesitate about moving the temporary incisors forward much, because we know the permanent incisors usually erupt in front of them. If the permanent incisors in either the superior or inferior arch erupt back of their proper line, the appliance should be inserted, and the teeth moved slowly into place.

I often insert the appliance for this purpose in the mouths of patients between the ages of seven and eight years, and hear no complaints or objection to the appliance.

In regard to moving the superior incisors outward where they bite

inside of the lower ones, I have not found it necessary to open the bite before moving them, since adopting the method presented this evening.

It will be observed that when the mouth is at rest, the teeth in the superior and inferior arch are not in contact. Consequently, when a pressure is instituted on the superior incisors there is no resistance on the part of the teeth in the lower arch, except in the act of chewing, and then if the teeth are sore from the movement the patient will occlude the teeth in a manner to avoid them.

The treatment of periostitis is facilitated by an appliance for opening the bite, which can be made by forming a crib to extend over an adjoining tooth to clasp it, with a thin piece of German silver formed to the grinding-surface and attached to the crib by flowing soft solder over it to any desired thickness with the soldering-iron.

I have models here showing all the appliances mentioned in the paper and many others.

With regard to the rusting of piano-wire, it is not necessary that the wires should rust out. In some mouths there is a greater tendency for the corrosion of the wires than in others. The difficulty is principally in mouths that are not kept clean. We should teach our patients to remove the appliance and to brush the wires thoroughly, especially where two wires come in contact, or where there is any particular depression. If you find that they do not keep them clean, use the knife and scrape the parts until bright, and if the teeth are discolored by the wires, the stain should be removed immediately.

I hope it will be understood that I use German silver or spring gold for most of the appliances, using piano-wire only where other metals are not sufficiently springy for difficult anchorages.

In plating piano-wire, melted tin will preserve the wires much better than gold or any electro-plating I have experimented with. I hope we will be able to get a metal that is as springy as steel, and will not be so liable to corrode. We always insist on keeping the teeth clean, and thus do not have any injury of the enamel.

My assistant is here, who has been making the appliances for about two years. I will be glad to have you ask him any questions you please after the meeting.

Dr. Nash. Has Dr. Jackson tried dipping the wires in shellac or anything of that kind, or lacquering them in the way brass is treated?

Dr. Jackson. When I first began to use piano-wire I tried sandarac varnish, but it did not prove satisfactory.

Adjourned.

B. C. NASH, *Secretary*.

TWENTY-FIFTH ANNUAL UNION CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

THE annual union convention of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York was held in the Chamber of Commerce, in Rochester, Tuesday, Oct. 31, and Wednesday, Nov. 1. The meetings were closed with a banquet in the same room on Wednesday evening, of which nearly every member of the different societies present at the convention, with a number of distinguished invited guests, partook. President A. P. Burkhart, of the

Seventh District Society, officiated as toast-master on the occasion. The social aspect of these annual meetings of the dentists in the western part of New York does much to cultivate the mutual respect of the members, and, bringing them in contact, out of business grooves, enhances and strengthens the *esprit de corps* among them, with the happiest result.

The convention was called to order at 3 P.M., Tuesday, Oct. 31; Dr. A. P. Burkhart in the chair.

The president in his opening address welcomed the members of the Sixth and Eighth District Societies to Rochester, and announced that every visiting dentist would have the privilege of the floor and be welcome to take part in the discussion of the papers read.

After the minutes of the last annual meeting had been read and approved, Dr. Arthur E. Jenks, of Rochester, read a paper upon "Professional Interchange."

Dr. Jenks characterized the gatherings of scientific and professional men as wholesome evidence to the public mind of the progress which is taking place along the lines of Christian reforms. From these unions the contact of differing minds caused the evolution of ideas which kindled the latent forces into resistless personal endeavor. Of coequal importance in this relation is the reading of periodical dental literature. Co-operation and the interchange of professional thought are the most potent factors in our advancement. Independence of each other, whether as members of the profession or as artisans, is utterly impossible. Just as the superior craftsman in every separate department of architectural engineering is dependent upon the fidelity of his subordinates, so are we mutually dependent upon the individual efforts of one another.

He quoted the following statement from Dr. J. Edward Line as appropriate to his argument: "The true professional spirit is one of generosity. The professions have not been uplifted along the lines of mercantile calculation. Each man has been willing to give something. One has had mechanical ingenuity, and has donated the results; one has had a gift of writing, and has given freely the contributions of his pen; another with a talent of speech or executive ability has used it for discussion, instruction, or organization." Many men through lack of confidence hesitate to bring the products of their thought, whether of mechanical results or mental endeavor, before their professional brethren. These he urged to plunge at once into the arena of discussion, and by such training acquire proficiency in doing their part toward professional interchange. He spoke of the great educational work in dentistry done by the World's Columbian Dental Congress, and said that the same spirit should animate the members of local and state societies. He paid a tribute to the silent members at dental meetings, who while they for personal reasons preferred to not let their voices be heard in discussion, were still respectful and interested auditors, who in their own way, through the channels of informal conversation, often did their part in contributing their share of professional knowledge for the benefit of their confrères. He, however, urged upon them the importance of making every effort to train themselves so that by slow degrees they might accustom themselves to speaking in public, and so give the results of their labors for the professional good a wider field.

Discussion.

Dr. W. F. Arnold said that so much had been said in the paper, and so well said, that it was scarcely necessary to add anything, except to give his hearty approval to the paper as read. The results of the interchange of ideas among dentists had entirely altered their relations to one another and to the people at large. In early days, when a dentist discovered or invented anything which enabled him to do his work better or more easily, one or the other of two courses appeared necessary and natural to him: either to patent his improvement, or to keep it a secret; either to make other dentists pay him for the use of it, or to deprive them of its use. The growth of the professional spirit changed this, and now every reputable dentist who has anything new and valuable seeks the first opportunity, in the society meeting or in the professional journal, to make it the common property of all.

But it is not only in the essay read or the paper contributed to the journal that professional interchange is beneficial to all, but the quiet interchange of ideas in conversation is perhaps better yet. Many of our members who attend these meetings never rise either to read or discuss a paper, but they exchange views conversationally and thus assist those with whom they come into association here. They are like the individual workman on a fine building, who carves the beautiful ornamentation of the stone-work; he is not known by name to the people who admire and enjoy his work, but the work is done, and remains a monument of the skill of the nameless worker. So much of the work of improvement in the dental profession is brought about by the quiet influence of the men who never address a meeting, but exchange views conversationally with those they meet. They have learned that the true gain is from imparting knowledge, and when occasion offers they do it freely.

We owe a debt to the great men who so well laid the foundations of our profession, which we can only repay by extending in our turn a helping hand to every one who needs assistance.

Dr. P. K. Stoddard was pleased to note the different spirit in the profession from that which generally pervaded it when he was younger. Then, every dentist was jealous of every other, and guarded suspiciously his knowledge and methods. Now, on the contrary, each one is ready and willing to help any other.

On motion, the subject was passed, and Dr. B. S. Hert read the following paper by Prof. R. B. Winder:

THE ETIOLOGY OF PUS-FORMATION.

The etiology or causes of pus-formation has been for years an obscure subject, and one of severe discussion; and as the question is not yet definitely settled, much diversity of opinion exists in regard to the matter. From all that is known and taught from our most competent sources, I am inclined to accept (*ad interim*) the theory that pus-formation is simply the arrest of development of the nucleus of the white corpuscle, which, if uninterfered with, goes on to a higher degree of development, and becomes the red corpuscle. Having stated my proposition as tersely as possible, I shall now proceed to give the reasons which have led me to this conclusion:

1. In all embryonic tissue the white corpuscles precede in appear-

ance the red, which I accept as positive proof that the white at all events does not owe its origin to the red.

2. The red corpuscle, according to Huxley, always assumes the shape of the nucleus of the white. If the nucleus is in form round, the red corpuscles are round, as in man, etc. If the nucleus is oval, the red corpuscle is oval, as is found in the camel, some varieties of the lizard, etc. Now, while this does not prove that the red is derived from the nucleus of the white, it is certainly strongly suggestive evidence.

3. According to Professor Foster, of Edinburgh, all amœbæ are composed of undifferentiated protoplasm, which simply means that they contain within themselves the pabulum out of which all the tissues in the body can be elaborated; differentiated protoplasm meaning the pabulum-matter from which some of the anatomical elements necessary to tissue-formation are absent.

4. When lesion occurs, no matter where in the body, inflammatory action, etc., with its accompanying symptoms, follows immediately; white corpuscles or leucocytes start on the march and rendezvous at the point of injury. Common sense would forbid the suspicion that they have marshalled their forces for injurious effect, and the very fact that they do contain within themselves all the elements for tissue-repair suggests the logical deduction that they have assembled at the point of lesion to aid in repair and do good instead of injury, consequently upon arrival they commence their good work. If the symptoms of inflammation, the inevitable result of all lesions, pass off by resolution, the assembly of leucocytes adjourns, and each individual goes on its way rejoicing. The work and mission of the repairing corps is over.

5. If, however, on the other hand, the inflammatory symptoms do not pass off by resolution, then comes the other alternative. If repair is to take place satisfactorily, pus-formation is induced, and the leucocytes do not disappear, but remain on the field of action.

6. The pus-corpuscle is a homogeneous mass with a distinctive form and structure, readily recognized under the microscope, always appearing and preceding repair by granulation. As this pus-formation does not take place prior to the appearance on the stage of the leucocytes, it is unreasonable to suppose or draw the conclusion that the pus-corpuscle is derived from this source.

7. Lesions heal either by scabbing, first intention, or by granulation. It is only in the last-named repair that corpuscles appear.

The above contains in a nutshell my deductions and inferences in regard to the etiology of pus-formation, and they seem to be rational and common sense.

As to the exact *modus operandi* of the development of the pus-corpuscle from the nucleus of the white by the arrest of its development into the red, nothing is known that I am aware of. When science explains the development of a seed into a blade of grass, or an acorn into a sprout which is to grow the oak, or how the germ develops into the tooth, then, and probably not till then, will be understood the vital changes and their secrets, which all over the body develop the different growths, organs, and tissues. No man knows what inflammation is; he may describe the minute histological changes which from time to time take place, and the accompanying

symptoms in the different stages, but the true nature of the *vis a tergo* is still an impenetrable mystery of biology. Like electricity and elasticity, the symptoms and evidence affirm their presence ; nothing more is known.

Discussion.

Dr. F. W. Low said that it seemed to him that the discussion of cell-life was like the experience he had had when a little boy and found a nest of pill-boxes. He opened the first box with curiosity to see what was within it, and found another box, which, being opened in its turn, disclosed still another ; but he persisted till he opened the smallest box,—this was the cell, and was empty, and so is the discussion of cells and cell-life.

Dr. C. S. Butler said the subject of inflammation is one of great importance to us, as a large part of our time is taken up in the effort to allay inflammation, and to stop the destruction of tissue arising from the formation of pus.

As to the definition of inflammation, it is disputed, but it seems to be caused by the secretion of broken-down tissue, which if it contains bacteria will become true pus, while what is called a cold abscess will develop slowly, remain for weeks, perhaps, and disappear without treatment or injury to the system.

Dr. H. S. Miller said his idea of pus was that it was decomposed serum, the result of broken-down tissue, and that bacteria are to be found in all decomposed matter.

Dr. W. W. Coon said the hypothesis of pus-formation in abscessed teeth was that the access of bacteria to the end of the root of the tooth caused inflammation, which brought about increased supply of blood to the part, which would in some cases tend to remove the pus and cure the trouble.

On motion, the subject was passed, and upon call for incidents of office practice, Dr. S. A. Brown, of Westfield, N. Y., reported a case of persistent fistula ; subject, male, thirty-five years of age, in otherwise apparent perfect health, with fistula discharging above apex of left superior lateral. The patient had received no treatment for six months preceding presentation, but prior to that had been under occasional treatment by some other practitioner for a period of more than two years. Upon examination there was found an open pulp-canal in the lateral incisor, through which into and out through the fistula injection could be readily accomplished. About the apex of the root of the tooth a carious cavity in the alveolus was discovered, but a probe detected no loose dead bone. The carious cavity was larger than a pea. Advice as to proper treatment was asked.

Dr. Low, Buffalo, N. Y. How long has the patient been under Dr. Brown's treatment? What measures for relief have already been tried, and with what result?

Dr. Brown. I saw the patient first about two months ago, and at once cleansed the parts with peroxid, then enlarged fistulous opening, and made free use of rose-bur in the fistulous tract and on apex of root. At a subsequent treatment injected through fistula from pulp-canal a solution of peroxid, and filled pulp-canal with gutta-percha. After an interval of several days, the fistula not being closed, a broach wound with shreds of cotton and dipped in glycozone was probed

into fistula. This completed my treatment. The result is that the discharge of pus has greatly diminished, but has not entirely ceased.

Dr. Low recommended, should further treatment prove necessary, that incisions should be made in the gum over the root of the tooth that together would represent the capital letter T, the stem of which should extend from a point somewhat above the apex of the tooth to the gingival border on the median line of the root. The gum being then dissected in two lateral flaps, a tampon should be used to stop the flow of blood until the condition of both alveolus and apex of root could be plainly discernible without hemorrhage. A sharp new plug-finishing bur-cone shaped with knife-blade edge should then be used both to bur out all alveolar tissue suspected and to trim off apex of root, freeing it completely from all cervical deposit. Apply a dressing of wine of opium to wound, and refold gum flaps; make a slight compress of bibulous paper wet with peroxid, and fold under upper lip to keep in apposition the edges of the refolded gum flaps. Instruct patient to constantly wear such a compress for a period of two or three days.

Dr. Low reported that he had once successfully so treated a similar case that in other hands had proven exceedingly obstinate. He believed the obstinacy in such cases arose from the presence of the cervical deposit more often than from that of dead bone.

Dr. Stoddard thought the younger generation of dentists and physicians were too eager to treat the microbes and other new-fashioned causes of disease. He knew of cases where, to destroy the microbes, medicines had been injected into a simple abscess which would have cured itself in five days, and the medicines had converted it into a poisoned abscess requiring weeks of treatment,—in some cases causing sloughing of the flesh. One physician treating a wound mistook the healthy granulations of repair for proud flesh, and burned them off with nitrate of silver. He knew before the modern antiseptic treatment came into vogue that frequently wounds got well of themselves,—better than they did now under the most approved treatment. He knew of a case of a cut one inch deep and four inches long which healed up in ten days without the formation of pus. Many obstinate cases of alveolar abscess are caused by over-treatment.

Dr. C. S. Butler believed it wrong to apply too many remedies to alveolar abscesses. Many cases which persist for weeks in spite of treatment would, if let alone, get well. Evacuate the abscess thoroughly, and nature will take care of the cure.

Dr. Stoddard mentioned a case which had been in the practice of his son. A physician had sent the patient to have a root extracted. The crown was decayed off clear to the edge of the gum. Upon examination it was decided, as the patient's health was bad, not to extract at that time, and the patient was dismissed with the assurance that it would not trouble him long. The pain, however, became unbearable, and the patient returned, insisting upon extraction. When the tooth was extracted it was found that there was exostosis, and subsequently necrosis, of the bone of the jaw. The diseased tissue was removed and treatment given, but erysipelas ensued, and the patient died.

Dr. A. P. Burkhart spoke of a case in his practice. The patient came to him with a lateral incisor which had been troubling her for

two or three years. Upon examination he found the root with a large opening through it. He sealed this up with gutta-percha, and treated the fistula with hydrogen peroxid. The result not being satisfactory, he removed the gutta-percha and filled the canal with orange-wood. He thought that the gutta-percha perhaps extended past the foramen of the root, while the orange-wood was carefully cut to the length. The after-treatment consisted in applying carbolic acid and glycerin to the fistulous opening, with the result of a cure in two or three weeks.

On motion, adjourned.

Evening Session.

The convention was called to order at 8.15 P.M., Dr. A. P. Burkhardt in the chair.

Dr. J. H. Beebe read the following paper :

CYLINDER FILLINGS.

I hope I may be pardoned for presenting at this time a paper the subject of which is the same as that which I read at the last annual meeting. I decided to take this subject, as I find that in my last paper I presumed far too much on the knowledge of a large number of the profession of the use of cylinders, and also because I find that I was very superficial in my treatment.

The use of cylinders in filling teeth with laminated metal had its origin in one of the southern states nearly half a century ago, and it is singular that so few of the profession have been induced to adopt it in their operations when it offers so many advantages and conveniences.

I firmly believe that no exclusively hard-gold operator can produce as good results with the welding process as he who uses soft gold in the cylinder form, and certainly the latter will have great advantage in that he does his work much easier and quicker, and relieves the patient as well as himself of long and tedious operations, many large fillings being completed without the use of the rubber-dam, and often with the absence of a napkin or other absorbent.

The main advantage, then, in the use of cylinders is rapidity and certainty of success.

Cohesive gold is really softer than the so-called soft foil ; but the fact of its being cohesive renders it incapable of being pressed in large pellets to the walls of the cavity and closely fitting that wall. It is more like a solid mass, for the leaves do not move freely upon themselves, and there is danger of bruising the wall either with the resisting metal or at least with the instrument, and thus leaving a loop-hole for the agencies of decay.

With cylinders these disadvantages are largely overcome, for the leaves do move freely upon themselves, and the mass used is so large that the walls are protected from the instrument.

In point of rapidity, it may be said that the competent cylinder operator will find four, and even five, cavities to one done by the cohesive-gold worker.

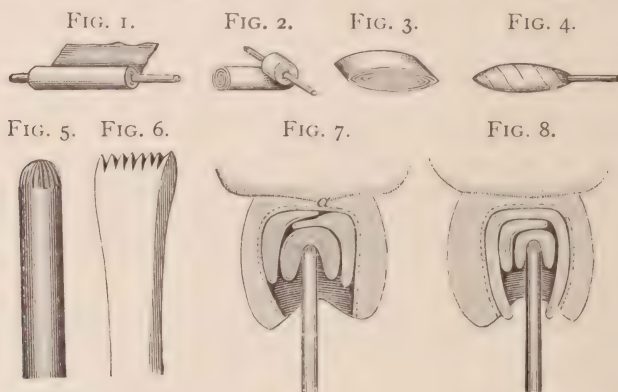
It has been said that cohesive gold can be so condensed that it may be rolled into plates or drawn into wire ; but this amounts to nothing, and may possibly, on account of greater conductivity of

thermal changes, be unfortunate in its effects, and certainly this fact will not preserve the tooth, which is the ultimate object. In cylinder work there is very little cohesion between the leaves of foil, but there is a better adaptation to the cavity wall.

To illustrate: Take a cylinder of soft foil between the thumb and finger, and squeeze it quite hard. Look at it afterward, and a well-defined imprint of the rugæ of the finger-tips will be seen, while cohesive foil similarly treated gives a far less clear impression of these rugæ.

I will first describe the mode of making the cylinder.

A piece of foil—one-half or one-third or even a whole sheet—is placed upon a pad of some elastic material, and a wire of a certain size is placed on its edge, and with the fingers the gold is rolled upon and around the wire (see Fig. 1). The size of this wire governs the length of the cylinder, which should be somewhat greater than the depth of the cavity, so that the gold, before final condensation, will protrude above the margin of the wall. The wire being withdrawn,



the roll thus produced is wound upon the point, or if a particularly soft cylinder is desired, upon the body, of a square or five-sided watch-maker's broach (Fig. 2). When this roll is large enough, the unwound gold is torn away from that which is on the broach, and that which is on the broach, *which is the cylinder*, is removed, and with gentle pressure slightly flattened between the thumb and finger (Fig. 3). Various lengths and sizes according to the cavity to be filled are made, and the gold is ready for use.

In preparing the cavity, there is absolutely no necessity of a retaining pit; a slight groove, shown by the dotted line in Figs. 7 and 8, is all that is needed, and in crown cavities in which the grinding-surface alone is involved, even this precaution is not necessary if the walls are parallel. The form of point to be used is shown in Figs. 5 and 6. The former is round, while the latter is flat and wedge-shaped. These are the characteristic forms, but of course there will be various sizes and crooks to enable the operator to use them in differently located cavities. I will illustrate the process of cylinder-filling by the drawings Figs. 7 and 8. These represent a bicuspid in which decay has removed a large portion of the approximal and also a portion of the grinding-surfaces.

For the purpose of being better understood, I have made these drawings, using blue, yellow, and red to represent the gold. The first cylinder—a large one—is placed in the cavity and pressed to one side, a portion of it lying against the cervical wall. Another cylinder is put in and crowded to the other side, a portion of this being allowed to cover the remainder of the cervical wall and also to overlap the first cylinder. A third cylinder is now placed in the center, and with a large wedge-shaped instrument is driven home. Then another cylinder is placed as at first, at one side, and another on the other side, with a third again in the middle and crowded home as before. Thus the operation is continued till near the grinding-surface, when we begin to anneal the gold and to alternate the cylinders from the horizontal to a perpendicular position.

Annealed cylinders, however, should not be used till all of the walls are protected with soft foil. After there is no more space to be filled, a large corrugated point is placed upon the filling, and with a reciprocating screw-motion and considerable pressure the surface is all gone over and condensed thoroughly. Then a smaller similar point is to be used, and then the burnisher. After a thorough burnishing the file, and again the burnisher, and where practical a small ball-burnisher, and lastly the finish. Let me add right here that there is no more necessary instrument than the burnisher, and on it depends the success of nearly every cylinder filling. The mode of filling a simple cavity is the same, except that nearly the whole of the operation is done by the instrument shown in Fig. 5. If there are fissures running out from the main cavity, they should be filled first. Then the large cylinders should be placed on either side and pressed outward; then one at each end, and the instrument, Fig. 5, forced into the center, thus creating a secondary but smaller cavity. As the operation progresses, smaller and smaller cylinders of necessity are used, until finally one tightly rolled is driven into the last opening left by the wedging instrument. The whole is to be finished as before. Where possible, I find that the lobed engine-burnishers are most useful, but unfortunately none of our manufacturers make them in correct form. If a soft spot is found, a wedge-shaped instrument is pushed in, and the space thus made is to be filled with a small cylinder. This last is, however, rarely necessary when the operator has become expert.

It may be urged that in using this process a plug may be made that will not completely fill the bottom of the cavity. This, however, is not the usual case, though it may be sometimes. For the sake of the argument we will admit it, and desire some one to point out the injury that may result. In conversation a while ago with Dr. E. A. Bogue, of New York, and also of Paris, he told me that he had removed cylinder fillings that had been in use for years, and at the time of removal were perfect, and these fillings never had touched the bottom of the cavity. Of course it would be preferable that no unfilled space should exist, but I do not believe any one can point to even an imaginary evil that would result from its existence.

A novice in this mode of operation, and one who has used gold in its cohesive form exclusively, will find one large bugbear. It has been his habit, when starting a filling, to fasten the first piece, and if after he has commenced a filling he finds that the gold is loose, he

will, if a conscientious operator, remove whatever metal he has placed in the cavity, and begin again. The cylinder operator would simply drive a wedge-shaped instrument into the gold, and in the opening thus created drive another cylinder, and if this is not sufficient he would do the same thing over again until he has the gold fastened.

I remember, about the time I wrote the former paper, I filled a cavity in the posterior approximal surface of a first molar. A large portion of grinding-surface, as well as the approximal, was involved, and before the gold became fastened I had in the cavity four cylinders, one containing a half-sheet and the other three-quarters of a sheet each of No. 4 foil.

Objection to this method has been urged by some of the wiseacres, that there may be—nay, is—left a triangular space at the point where the cervical wall and the two cylinders meet (Fig. 7, *a*).

To demonstrate the fallacy of their position, I have filled a cavity in a piece of pearl, and have very carefully stoned down the surface with a very fine stone. Those who are wise on this subject will please examine it under a glass here on the table. This glass magnifies 559 diameters,—291,200 areas.

In all of this form of work, hand-pressure alone is advocated, and will, I believe, do the work better, safer, and easier for both patient and operator than any other mode. There are some variations from the above description that may be of interest.

In Fig. 8 is shown a mat of gold lining the entire wall of the cavity, with cylinders in place, crowding it to the wall. Our triangular friends will here find a relief. Another way, and a very good one where a small cavity occurs in a position that renders a good view difficult, is to fill by means of a telescopic cylinder (shown in Fig. 4). The piece of pearl has a round filling in it that was done in this manner.

This form of cylinder is a little different from those already described, in that in rolling the gold upon the point of the broach it is done spirally, and when of sufficient size is revolved between the thumb and finger till tight and perfectly smooth.

It is then removed from the broach, and the open end—the end farthest from the point—placed in the cavity and forced in by a pair of pliers grasping its apex. The remainder of the operation is then to be finished as in the process already described. The action in this case is that of a roll of paper, the center of which has been drawn longitudinally from the coil and pushed back to its original position.

There are a few other modes of preparing the gold that I have not mentioned. The principle of the work is not different, however. If it is desired to use an even flat cylinder, a flat, thin screw-driver-like instrument, instead of the five-sided broach, may be used. Instead of rolling the gold upon the wire, it may be folded by means of a long, slim knife, the edge of which is to be placed longitudinally through the center of the sheet as it lies upon the elastic pad. Gentle pressure will crease the gold so that it can be folded upon itself, and several repetitions will fold the gold into a long, narrow strip, which can then be rolled upon the broach.

The beginner in the use of cylinders must not be discouraged if he fails in several attempts. He will find the first pieces of gold dropping out of the cavity, and the portion that is used cohesively will

fall out, owing to the fact that he condensed the surface too thoroughly as he proceeded. He will find, when he comes to finish, that his cylinders are not long enough, and though the filling may have no soft spots in it there will not be metal enough to finish the filling. Experience alone will remedy these difficulties, and when the operator has thoroughly mastered this mode, he will wonder how he ever practiced dentistry before, and many a gold filling will be seen in his patients' mouths that otherwise would be of cheaper material.

I have endeavored to give you the main points of this process. There are many little modes and dexterities (if I may coin a new word) that will come to the operator by practice.

I do not wish to be understood to claim that every filling can be put in wholly with cylinders, or that there are not cavities where cylinders would be useless; but I do know that there are few cavities indeed in which cylinders cannot be used to the advantage of patient and operator, and that the final success of a large percentage of operations will be enhanced thereby.

Discussion.

Dr. S. B. Palmer said that the subject of cylinder fillings was not new to him, as one of the first lessons he had learned in dentistry was to make cylinder fillings, and he had always retained a liking for them. He spoke of a patient who was under the necessity of leaving the city, and called upon him to put a temporary stopping in a large cavity in an inferior molar. He prepared the cavity and inserted a filling, using soft gold cylinders, and had it finished in very little more time than it would have taken him to put in the temporary filling. It would be impossible to do a more satisfactory filling in any other way than this had been. He said one thing that was in favor of this class of fillings was that the gold was in more perfect contact with the walls of the cavities than with any other, and that even if the cavity was moist or even wet when the filling was inserted, it did not destroy the usefulness of the filling, while any slight imperfection in a filling with cohesive gold was fatal to its usefulness.

His method of inserting his first cylinder is, instead of leaving it in the shape of a loop to cover the walls of the cavity, he bends it back upon itself. His idea is that the succeeding wedges of gold will press harder against the wall than if they first extended so as to cover it. A filling begun in this way and finished with cohesive gold may be carried up into the most beautiful contour work.

Another advantage cylinder-filling had over the cohesive-foil fillings was that it did not require so much malleting. He thought in many cases of soft dentine filled with cohesive gold the walls were pulverized by the malleting needed to condense the gold. No cylinders which have ever been put upon the market answer as well as those made by the dentist in the way described in the paper.

Dr. Beebe said that some time ago his partner had made up some cylinders and sent them to one of the leading manufacturers, asking if they could not be prepared for the profession, but that no answer to the letter was ever received.

Dr. M. S. Jewell said there was no operation which he was called upon to perform that gave him more satisfaction than the insertion of cylinder fillings. There was one point to which he would call atten-

tion, and that was that the cylinders should be of sufficient width so that they would extend above the margin of the cavity, so there would be something to build up against. All crown cavities, particularly in the crowns of molars, were well adapted for cylinder fillings. He had found Pack's cylinders to work well.

He spoke of having inserted quite a large filling in the mesial surface of a first molar for a lady. Time was short, and he prepared the cavity and finished the filling in not more than fifteen or twenty minutes. This was several years ago, and the filling is quite perfect yet.

Dr. Beebee said that a gentleman came to his office this morning with a small fissure-cavity in a first molar. He prepared the cavity and filled it with a single cylinder like Fig. 4, the whole operation not requiring more time than the telling of it did.

Dr. P. K. Stoddard said some things were so old that they become new, and this cylinder-filling was one of them. When he started to learn dentistry he was shown how to make cylinders, how to clean out the cavities and crowd the cylinder in all you can, and then press it down *hard*. When the cavity was what we now know as an approximal cavity, it was filled till the gum was nearly reached, then the gold was made into a rope and crowded in piece by piece, putting the last pieces into the flame of the lamp to make them a little harder, and then pressing them in. He said that he could fill more teeth in this way in three hours than the best dentists of to-day do in three days.

Dr. G. W. Tripp said he used to saturate the walls of the cavity with sweet oil and then fill with soft gold, and it made a good filling, too. He wanted to know what effect the oil would have on the operation. He knew it was a good way to operate, but did not understand why the oil was used.

Dr. Stoddard said that the filling would displace the oil, and the oil would carry out the moisture with it. Continuing, Dr. Stoddard said in cases of very large fillings, where it was an object to the patient to reduce the expense, he frequently filled the cavity partially with tin, and then finished with soft gold and cohesive gold. Is there any galvanic action or other reason against putting two metals in the same cavity?

Dr. B. S. Hert asked Dr. Beebee if he condensed the soft gold before he began to anneal his cylinders.

Dr. Beebee said, No. Failures would occur unless care was taken not to condense the soft gold too thoroughly. It should be only slightly condensed till after the cavity was filled, when it should be very strongly crowded down.

Dr. Leroy Requa said, in regard to putting two metals in the same cavity, that when he began practice it was thought undesirable, as it was supposed there would be galvanic action, but now it is generally considered safe and good practice.

Dr. Stoddard thought that if both metals came to the surface it might cause galvanic action, but that if one were entirely covered by the other it could not.

Dr. C. S. Butler called upon Dr. L. S. Straw, of Newburgh, for an expression of his views on the subject of the paper.

Dr. Straw said he could easily talk for hours on the subject of cylinder fillings. Perhaps the very first operation in dentistry he had done was to fill a tooth with soft gold cylinders. He thought he did extract a

temporary tooth from a little girl first, but then began filling teeth. He believed there was nothing better. If a cavity is prepared with parallel sides, there will be irregularities enough in the wall to hold the gold, and all that is necessary is to fill the cavity as full as you can get it, then pack it down and burnish it to make it perfect in its adaptation to the walls, and it will stand. Of course we could not do some things that can be done with cohesive foil and the rubber-dam, but with a simple cavity, well prepared, there is no better material for a filling than soft gold cylinders. He used to use tin, but after the introduction of amalgam that was used instead.

Dr. Beebe, addressing Dr. Straw, said, In my paper I said that some of the wise ones thought there would be a triangular space left at *a* in Fig. 7. Do you think that would be so, and if it would cause any harm?

Dr. Straw said he did not put it in, in the way Fig. 7 showed, but did not think there would any harm result if there were such a space.

On motion, the subject was passed, and Dr. F. I. Sumner read a paper, an abstract of which follows, on

THE MANAGEMENT OF THE GINGIVÆ.

I hope, in this paper, to magnify in a measure the importance of constantly guarding the gingival margins and protecting the interproximal gingivæ, and shall offer a few thoughts on pathological conditions of the gums and pericementum, having their incipency in this locality.

The care of the gingival margins, and especially the interproximal gingivæ, is of paramount importance, and all operations should be performed with that object constantly in view.

Examine a normal arch, and observe the protection afforded to the gum in these spaces by the approximal surfaces of the teeth bellying out against one another.

By the use of the file the form and general contour of these surfaces are so often altered that the teeth have changed their positions, so that they no longer brace one another at or near their occluding surfaces.

"After filing," says Dr. Black, "the interproximal gingiva has been destroyed in some cases so completely that there is no soft tissue between the proximate surfaces further than the gingival line, and even on the cervical portion of roots a trace only of the peridental membrane remains. This slight and much-crowded tissue is kept in a state of irritation by the wedging of food against it."

Micro-organisms find a lodging-place, and the irritation is of that character which will cause the patient to keep the mind constantly on the trouble. To obtain temporary relief, a cotton dressing charged with a soothing antiseptic—campho-phénique, for example—is the best remedy.

The neck of the tooth is that portion encircled by the gum, and is called the gingival line. The gum-tissue hugs, as it were, the normal tooth.

Guarding the gingivæ from injury is a prophylactic measure, and this, together with dental hygiene, will do much to rid us of some forms of gingivitis.

We have seen that all of the teeth are a little broader, in a mesio-

distal direction, at or near their occluding surfaces than at their necks, and their approximal surfaces touch in such a way as to leave the V-shaped opening between their necks, which is filled with this gum-tissue. This, it seems to me, is one of the most powerful arguments in favor of contour filling to guard the gum at this point by knocking out the gold in a manner that approaches in form the strong walls of enamel, thereby preventing the food from being forced up against this tissue, which in man is not intended to be used for such purposes.

Any irritation of the pericementum is one of the most frequent causes of hypercementosis, with its train of suffering.

Food lodges here, the pressure causes pain, and to obtain relief the use of the pick is resorted to, the constant use of which adds fuel to the fire. Even when the quill pick is used with care, the sufferer will punch and scarify the gums, obtaining temporary relief, but not materially helping matters, and the irritation is increased. It seems to me a separating file ought never to be placed in the hands of a student until he has a thorough understanding of how much injury may be done with it. In removing dam and wedges, be sure that little splinters and bits of rubber are removed. When examining a case presenting the symptoms,—redness, heat, and a discharge on pressure,—look for foreign bodies.

A gentleman presented himself to me recently complaining of that feeling of fullness, saying that the gum bled frequently between the lower bicuspids. I found a small hard substance, that to the sense of touch seemed enamel. After repeated efforts I removed a small supernumerary tooth, which was smaller than a grain of rice.

We hear patients complaining of amalgam exerting a deleterious influence on the health, and physicians refusing their services till all that "poisonous stuff" is taken from the mouth.

Is it not that unfinished shelf which is allowed to hang over into the soft tissues, providing a "boarding-house" for microbes? I refuse to insert an amalgam filling in the cervical margin unless the patient can return and have it finished after it has hardened. The cervical margins of gold fillings in many instances are not properly finished. Suitable proximal trimmers are required to leave a smooth, clean margin.

The bands to roots, if fitted with accuracy, are not a source of irritation, but there are many cases of inflammation resulting from ill-fitted ferrules and caps.

In cigarette-smokers I have observed a form of gingivitis that is peculiar in that there is a purple line at the free margin of the gums, resembling that found in lead-poisoning. There seems to be a peculiar selecting power in these cells, whereby such substances as potassium iodid, mercury, and poisonous substances in the blood are taken up, and this may be the means of determining the presence of diseased conditions by observing physicians.

When the gum shows signs of irritation, always explore for tartar, which acts as a poisonous irritant.

After removing all traces of tartar and prescribing the indicated remedy and local wash, I insist on the patient, who has been suffering from calcic or other inflammation, using massage, and have observed rapid progress toward a normal condition when it was faithfully carried out in conjunction with the mouth-wash.

Pressure, gentle at first, rubbing the gums and beating them with the ball of the finger, coaxing the gums around the neck of the tooth, and using a brush with up and down (twirling) movement.

Where there is hypertrophy of the interproximal gingivæ, excise with gum-scissors and pack the space with cotton charged with a paste containing tannin, and prescribe hamamelis locally as a wash in combination with massage.

In children, these spaces, if exposed by the file, are a great source of annoyance. Mastication is painful.

It is wise to fill with gutta-percha or amalgam, bridging the spaces.

If nature had intended us to have cone-shaped bicuspid and molars, a provision would have been made for a very tough gum, able to resist all irritation.

Can it not be said that *no* dentist has done his duty who does not (as the very title of doctor would imply) teach his patients?

We cannot afford to let any one pass from the office without having learned some point which enables him to aid in the preservation of the health of the parts which the dentist has spared no pains to restore to a clean and healthy condition.

Discussion.

Dr. F. W. Low said that this was a most excellent paper. It was one of the troubles of his practice that so many patients came to him with their teeth in such condition that the gingival margin was unprotected, and it was also the case where there were cavities extending below the margin of the gums. Of course, contour fillings were the remedy in these cases, but if there is any prophylactic treatment he would like to know it.

Dr. F. B. Howe said he had used listerine diluted to suit the taste, also trichloroacetic acid and pyrozone, with good results.

Dr. Leroy Requa said the paper hit him on a sore spot. Some years ago, after reading Arthur on V-shaped spaces and Bonwill's papers on the same subject, he was convinced that self-cleaning spaces were just the thing, and for about two years he had carried out this belief conscientiously. Those two years of practice have since been the greatest grief of his professional life. Some of the patients still come to him with gingivitis and other troubles due to this great mistake on his part, and he did not know how to treat them. He usually recommends listerine to be used as a mouth-wash.

Dr. I. C. Edington spoke of the necessity of a careful and correct diagnosis, and mentioned a case of a patient who came to his office with a bicuspid which was very sore. He diagnosed a dead pulp, and the condition was such that he could not extract the pulp and treat the tooth, so he extracted the tooth. Upon examination, he found an amalgam filling with a ragged edge at the gingival border, which had been the cause of all the trouble. A careful diagnosis would have saved that tooth. He never was willing to put in amalgam fillings that he could not have return to his office in two or three days for him to finish. The amalgam will shrink and swell even after two or three days, and make a shelf which is liable to irritate the gum and cause very serious trouble.

Dr. Howe asked if there was not more of this shrinking and swelling in some amalgams than in others. His practice, when putting

amalgam fillings in approximal cavities, is to pass a piece of floss silk up and down between the teeth, and he did not think there could possibly be any ragged edge left when this was done. Sometimes it was necessary to pass an instrument up under the gum to bring down an edge after the silk has been used.

Dr. S. B. Palmer spoke of a sea-grass line which he used instead of raw silk, with advantage. He said the paper under discussion gives many excellent points and valuable suggestions relating to the gingivæ. This "vulnerable point," "gum-line," "gingival border," etc., seems to be environed with mystery. All treatments recommended are applied to effects, or to superficial causes, while the underlying principle is not considered. He could not add anything to practically benefit or overcome the difficulties confronting practice. As already understood, the necks of the teeth being smaller than the crowns, with receding gums, form pockets in which food becomes lodged, fermentation occurs, and dissolving of the lime-salts results. Cleanliness and removal of food are well-known remedies.

Back of the paper and discussions there is a law and principle in nature which produces decomposition at this line greatly in excess of the mere lodgment of food and the action of liquids. He did not intend to introduce what to him explained this increased chemical action and chemical changes which take place at the line of the gums, in connection with the teeth, because it is related to the same phenomena and laws which were announced twenty years ago, and which by some were pronounced heretical. To-day practice has not only absorbed the ideas set forth in the relation of gold to amalgam, but advocates the use of copper amalgam, which is in advance of his own practice. Having lived to see that the doctrines taught have received scientific and practical sanction, he would not disturb the harmony of practice by the introduction of ideas which might not be accepted.

He knew of no department of dentistry which is to receive more benefit in the future than the operative, through electro-chemistry.

Dental chemistry is taught in our schools, though little does it contain more than general chemistry applied to professional needs.

He would endeavor to show, if possible, that the gingiva is, by a principle, a line of electro-decomposition in addition to ordinary chemical action, and would show by analogy the working of this law in nature, and in the laboratory, as well as in the oral cavity.

At the surface of the ground the earth is at zero, or negative to the air and clouds, or the air and clouds are of a higher potential than the earth. An iron rod, if but a few inches long, if suspended vertically, will be polarized; if the rod is turned, the upper end will be of the same polarity with the lower end. This represents the first principle, and being a magnet does not relate to chemical action.

The second manifestation is in organic chemistry, relating to vegetables. The foliage of a tree is of higher potential than its roots. Decomposition and work is done where the extremes meet, which is at the point of contact of the rootlets with the soil. If seed is planted in clean sand upon polished marble or limestone, the roots spread out upon the marble and decompose it for food to strengthen the stalk. This law is observed in plants as well as trees, and down to the mold patches seen upon marble slabs and monuments; each patch is

a miniature forest, with the rootlets extracting food from the soil or lime element. Every pot in which a plant, flower, or vegetation is growing becomes an earth to the growth. And when we turn to substances without life, the same principle is at work. A post set in the ground decays at the surface, not at the bottom. The work done is to decompose the wood. The point of high potential is the upper stratum or surface of the moisture. During a rain it would be from the highest point that is wet, and so down to the lowest moisture-mark. The bottom of the post would be the last to decay. A log lying upon the ground, even a board, is influenced by the same law. Again, if a piece of wood is removed from the ground, held in a position vertical or horizontal, and wound with a bandage that will retain moisture, the inner surface of the winding as well as the wood will be negative to the outer surface, which is exposed to the air. Like the flower-pot, it has a law unto itself. Decay will occur upon the surface next the bandage.

So if a tooth is wound with a ligature and neglected, the enamel becomes injured, the tooth decays, and the crown falls off. The root remains, because the root below the margin of the gums is in a field negative to the line mentioned.

We are told that different microbes flourish in pus-pockets and in roots below the gums from those found in cavities above the line. This principle is manifest on removal of crowns when cement has been washed out for a long time. Decay is rarely seen beneath the band. A like open space upon the crown, or a loose metal filling, is an element of decomposition.

It is not necessary that the elements for galvanic action must be metal. Any conductors of electricity in the mouth which are chemically acted upon by the fluids, one is of higher potential than another, and thus a current is the result.

We cannot enumerate the evidences of potential and its effects. The tin wash-boiler or tea-kettle with a copper bottom throws an influence upon the iron near the union of the two metals, and the iron becomes a positive plate in the battery. Moisture at the seam allows galvanic action, and pits or holes appear through the tin much sooner than would occur in a vessel of tin alone. Again, the vulcanizer grows thin and weak at the average water-line, because oxygen is set free by decomposition of the liquid, and attacks the copper, while the hydrogen rises above. The pencil of zinc in a Leclanche cell shows the same action at the surface of the liquid. A thin copper wire suspended in diluted nitric acid is eaten off at the liquid line, while a wire placed upright from a base in the liquid will be eaten away at the surface. That portion extending only a line above will be covered with green froth, and will be maintained at the same height.

To him it seemed plain that the decomposition of food and decay of dentine at the gingivæ is accelerated by electro-chemical action, the same as in the cases cited above.

Dr. J. A. Stackhouse said that above the margin of the gum, on the approximal surface of the tooth, there were frequently two prominences which made it impossible to get all the particles of amalgam out with strips or floss silk, but some instrument must be used to clean this place up and bring out the amalgam.

Dr. Coon said with a very fine flexible instrument the surplus can be taken away perfectly.

Dr. C. T. Howard said that in carnivorous animals the teeth are very much enlarged above the margin of the gum, so as to form a shelf over the margin, and this shelf protects the gum from injury from the bones and other hard substances the animal eats. In the herbivorous animal the tooth is quite square from the gum. In the carnivorous animals and in the human mouth the gum is quite thin at the margin, and if not protected would be constantly liable to injury.

Dr. F. H. Lee requested Dr. Palmer to tell more about the sea-grass he had mentioned. It had proved so excellent in his practice that he thought all should know of it.

Dr. Palmer said he had used it for ligatures to bind teeth which had become loose, and it would last for from one to two months before it would decay and come away, and it would not become soiled and discolored as silk does. It was so smooth and so hard that it would serve every purpose of floss silk, and serve many uses which floss silk would not.

On motion, the convention adjourned to the next day at 9 A.M.

SECOND DAY—*Morning Session.*

The convention was called to order at 9.30 A.M., Dr. Burkhart in the chair. The first hour was devoted to clinics and demonstrations.

Dr. J. H. Downie demonstrated the use of Downie's porcelain crown furnace with Downie's porcelain body. This latter preparation comes in an assortment of twenty-four colors and shades. It is a low-fusing body, and extremely useful for crown- or bridge-work, and also for continuous-gum sets.

Dr. J. H. Beebe meant to have demonstrated his process of cylinder-filling, but not having been able to find a patient with a suitable cavity in a tooth, he filled a large cavity in a piece of ivory in the manner described in his paper, also one or two small cavities, using only a single cylinder.

Dr. F. B. Darby described by the aid of the blackboard the use of Angle's system of correcting irregularities of the teeth.

Dr. F. W. Low demonstrated the use of forced respiration for treatment of cases of asphyxiation from nitrous oxid or other anesthetic. This remedy would also be found valuable in cases of drowning or asphyxiation from illuminating-gas, or in morphin or opium poisoning. He said that not long since, in Buffalo, they had had a death from the use of nitrous-oxid gas in dental practice. The patient was a lady about twenty-six years of age, and though the usual means of inducing artificial respiration, as well as all other ordinary means of resuscitation, had been employed, death ensued, though not till fifty-five minutes after breathing had ceased. Upon post-mortem examination, no indication of disease of the heart or other organs was found which could account for the death.

Dr. Low expressed it as his opinion that if forced respiration could have been resorted to, the recovery of the patient would have been assured. The method which he showed requires the use of a gasometer, with the usual face-piece, but with the valve removed, so that the gas can be forced into the lungs. A cork should be inserted in place of

the valve in the inhaler, and the chamber of the gasometer filled with atmospheric air, or preferably with a mixture of nitrous oxid and oxygen gas in the proportions of four to one. The face-piece is then held over the face of the patient, and pressure upon the top of the gasometer forces the air into the lungs. When the lungs are filled, the pressure should be withheld, and the lungs will force the air or gas out. This should be continued until the sympathetic ganglion resumes its office and natural respiration begins.

He related instances where Dr. George E. Fell, of Buffalo, who originated the process, sustained life in cases of opium narcosis for from one to fourteen hours, literally pumping the breath of life into his patients against their will, for the cases were mostly suicides, and in nearly every case succeeded in saving the life.

Death, or even alarming symptoms, from the use of nitrous oxid are so rare that we scarcely feel the need of an antidote at hand, but it is well to know what may be resorted to, for the sake of the feeling of comfort it will give.

Dr. Leroy Requa read the following paper upon

DESTROYING PULPS WITH ARSENIC.

The uncertainty attending the use of arsenious acid for the purpose of devitalizing the pulps of teeth renders its use unpleasant and unsatisfactory in many cases.

Many combinations of arsenic with other drugs, such as morphia, iodoform, cocain, and the like, have been recommended to us in the form of nerve-pastes and powders, to facilitate the speedy and painless death of the pulp.

They all leave much to be desired. We have tried them, and found them wanting. Much or part of the trouble arising from the use of arsenic, either alone or in combination, is due partly to the careless manner in which the application is made, and partly to the pressure caused in sealing the drug in the cavity. The best success I have ever had has been during the past year and a half, and I have been using clear arsenious acid and lots of care.

My method has been about as follows: Let us suppose a case of exposure in a molar, with a large crown cavity. The frail and overhanging edges are trimmed and cut back, so that a good view can be obtained of the pulp, or the place where it ought to be.

With a large spoon-excavator the carious matter is removed as far as possible, without cutting into the chamber. If there is a tough, leathery skin surrounding and partially covering the pulp, it is left intact. The cavity is then bathed with oil of cinnamon, and the pulp is ready for death.

Next, from a piece of good tough spunk is cut a thin disk that will cover about one-half of the floor of the cavity. This is moistened with carbolic acid, and the smallest possible quantity of Squibb's arsenious acid is worked or pricked into one side of the spunk. This is then placed death side down on a glass slab, and dried with bibulous paper.

The cavity is made ready in the usual way, and the disk of spunk applied directly to the pulp. The cavity is then dried with hot air and sealed with gutta-percha. In sealing, a small piece of gutta-percha is warmed in the flame and mashed thin between the thumb

and finger. This is placed on a curved spatula and drawn across the cavity, thoroughly sealing it without pressure.

A pledget of cotton is sometimes placed in the bottom of the cavity before sealing, to prevent pressure.

In approximal cavities where the cervical wall is below the margins of the gums, the gutta-percha is pushed down against it with a thin bent spatula after the cavity is sealed. This prevents all danger of leakage and death to surrounding tissues.

According to Truman, the action of arsenic on the pulp is, *first*, excitation of the sensory nerves; *second*, paralysis of the whole nervous system of the pulp. Death does not follow until some time after, or until the arsenic is slowly absorbed.

The point which I wish to impress is this: The arsenic being worked into the little disk of spunk does not give the exciting effect or shock to the sensory nerves that it would were it placed there in a mass, full strength.

The absorption takes place more gradually,* and before much pain is felt paralysis begins, and by this time the full power of the drug is at work.

Different writers vary as to the time occupied for the complete destruction of the pulp, some holding twenty-four hours is sufficient, others forty-eight hours, one even recommending repeated applications extending over a period of five or six days. My own experience has taught me that twenty-four hours is quite long enough to leave an application of arsenic in a tooth. Then the pulp can be extirpated before the stage of paralysis has passed off. In the majority of cases, when the arsenic has been left for two or more days, a soreness of the tooth is complained of, and a marked congestion of the peridental membrane will be found.

In the anterior teeth, where conditions were favorable, I have had the best success from applying arsenic in the morning and cleaning out the canal and filling in the afternoon. Another point which I wish to mention is the generally accepted theory that an inflamed and aching pulp will not take kindly to arsenic. My experience has led me to believe that this is something of a fallacy. I have repeatedly had exposures of long standing when the pulp was blue with congestion, and had given pain for days, succumb in twenty-four hours after the treatment by this method. We have all too often heard the same tale of woe, sleepless nights and hours of pain and suffering following the application of arsenic.

I am happy to say that in the past year and a half I have had only one or two cases when the pain continued for more than one hour. In most cases the pulp was quiescent on the patient leaving the chair.

Again I will say what I said in the beginning, that the devitalization of living pulps with arsenic is uncertain and unsatisfactory, and it is hoped that in the near future we will have an agent upon which we can place more dependence.

Discussion.

Dr. Frank French said the use of arsenic for the destruction of pulps could be traced back to Dr. Spooner, of Montreal, in 1849. The abuse of it can be traced to dentists everywhere, and it is because

of the lack of knowledge of the construction of the teeth and of the pulps, and the lack of the knowledge of dentistry in general.

Arsenic applied for the purpose of destroying the pulp is liable to cause trouble, not only to the tooth, but to the organism in many ways. Its action on the pulp causes first inflammation, next congestion, then death.

The mode of using the arsenic described by the paper was new to him. He had never been able to benumb the pulp in so short a time. His custom is to let the preparation remain from four to six days; a shorter time he had not found safe. When the arsenic remains this long, the pulp will be found to be a leathery substance which can be removed without pain. He uses pure crystal arsenic. The action of the arsenic of commerce, which, though so cheap, is largely adulterated, is very different from that of the pure crystals. If this plan of Dr. Requa's will work well, it will be a great boon to both the dentist and the patient; but even in five or six hours, the arsenic will get into the tubules of the teeth, and may cause trouble. To guard against such trouble, he always enlarges the pulp-canal up to the dead line, so as to remove all broken-down tissue.

Dr. L. S. Straw had no criticism on the paper, but he had quit the use of arsenic for the destruction of pulps, but used a preparation, the name of which he could not recall, which had been given him by the representative of Messrs. Ash & Sons at a meeting at Newburgh. This preparation does not seem to get up any inflammatory condition, and in two or three days the pulp will be easily removed. His usual plan is to apply muriate of cocain, and he can remove the pulp painlessly in from ten minutes to half an hour. In the molars this cocain treatment is not best, but in the incisors he always uses it. In case there is considerable hemorrhage, he lets the patient go; but usually there is not much, and a crown may be put on at once.

Dr. Frank French did not think there could be much hemorrhage from the use of cocain, and did not understand why there should be inflammatory trouble from the use of arsenic.

Dr. L. S. Goble said he had used cocain often on pulps and removed them painlessly, but not if there was any inflammation; neither is arsenic successful upon inflamed surfaces. He had known cases where arsenic had been applied to a pulp once a month for six months, and to apparently thrive under the treatment. He had yet to find a way to kill a pulp which was inflamed and only half filled the canal.

In answer to the statement that cocain would not take effect upon a pulp that was inflamed, Dr. Straw spoke of a patient who came into his office shrieking, "Give me cold water! Give me cold water!" He furnished the water, and the patient's mouth being filled with it, she subsided for a few minutes. In a little while she was able to tell that she had a tooth setting her crazy with pain, but which the cold water relieved. After much coaxing, he got her to allow him to adjust the rubber-dam on the tooth, which was an upper molar, and found an exposed pulp. He injected cocain repeatedly, and finally, after about two hours, was enabled to extract the pulp without pain, and he filled the tooth.

Dr. F. E. Howard said he had removed pulps by the use of cocain after two or three hours. He thought a longer time was too long, as the pulp will, in part at least, recover its feeling.

Dr. J. H. Beebee said he had used the preparation for two or three years of which Dr. Straw spoke. It is Baldock's nerve-paste. He was always successful with it. He found that when using it the pulp was destroyed only three-fourths or five-sixths of the way up toward the apex; this was an advantage, as there was no danger of the devitalizing agent getting through the foramen. After removing the dead portion, he removes the remainder by plugging it out with a nerve-broach or a sliver of hickory, and this causes very little pain. He had not used cocain recently, and did not like it. He finds that it requires wonderfully little of either arsenic or this paste to effect the destruction of a pulp.

Dr. F. B. Darby said that the vitality of pulps must be very much less in some districts than where he practiced. He did not believe there was a pulp in Chemung county that could be devitalized in twelve hours. As to the preparation spoken of by Dr. Straw, he had used it, and had had more trouble with the confounded stuff than with anything else he had ever used. It would not destroy the pulp more than half-way down, and he was too tender-hearted to drive a plug into a living pulp. He uses arsenious acid, and leaves it in not less than three days. In some cases the application of arsenic causes very much pain. He had one case to which he had applied it six times, and each time had to remove it within an hour, on account of the pain. The pulp was in the anterior root of a molar, and at length he opened a filling in the posterior part of the tooth, where the pulp was not exposed, and applied the arsenic there. It is there now, and he expects to be able to destroy the pulp in this way.

Dr. S. S. Stowell, of Pittsfield, Mass., said that in Massachusetts the people must be like those where Dr. Darby practices. He uses arsenious acid and acetate of ammonia, places it upon a pledget of cotton so small that he can scarcely handle it, and covers it with soft phosphate cement and leaves it for ten days. At the expiration of this period the pulp can be taken out without pain. He had done it on an anterior tooth when it was congested, by using chlorid of ethyl until it was congealed away down. This was in a case of necessity, and is not his usual plan.

Dr. F. H. McGeorge uses cobalt, and does not leave it in more than from eight to twelve hours. He tries to apply it in the afternoon and remove it the next morning. It can usually be removed at once. If there is any vitality in the pulp he injects chloroform, which enables him to remove it painlessly.

Dr. Requa said his experience with arsenic had been different from that of some of the other speakers. For several years he had applied the pure crystals of arsenic with carbolic acid. He usually found twenty-four hours sufficient. Then he left it on longer, from two to five days, but found that this caused more pain than when it was left only twenty-four hours. He therefore began to shorten the time, till now he finds there is more numbness at the end of twelve hours than when it is left a longer time. During the last four or five months he has left it in only from four to five hours, and has never had less pain. He tried several preparations, but settled down to from seventy to one hundred parts of a grain of Squibb's arsenic moistened with carbolic acid. Much trouble is experienced when there is a small portion of dead pulp between the application and the part of the pulp which is

living. In such a condition the application is useless, and blame may be laid on the preparation used. His procedure in such a case is to fish out the dead portion with a barbed broach as thoroughly as possible without causing pain, and carry the arsenic and carbolic acid up to the living part of the pulp on the broach. In anterior teeth he does not use arsenic, but the carbolic acid alone, which produces complete numbness.

Dr. Beebee said there was no sign, "Painless Dentistry," over the door of his office, and his practice was to plug out the living end of the pulp which had been destroyed part way down. Really the pain was not serious.

Dr. C. W. Stainton did not approve of the use of either carbolic acid or sandarac varnish in connection with arsenic, as the acid coagulates the pulp, and thus protects it from the action of the arsenic, and the varnish is liable to envelop the arsenic and keep it from action. He puts a small portion of arsenic in a little lead cap, and applies it thus to the pulp and covers it with beeswax, and leaves it twenty-four hours, and expects to find at the end of that time the pulp dead and ready to be removed.

Dr. C. S. Butler said that to make the application of arsenic at some distance from the pulp to be destroyed was good practice when the pulp was inflamed. Such cases were common in almost every man's practice, and caused much vexation. Sometimes it was advisable to drill a hole down to near the pulp, and apply the arsenic in the cavity thus made. It will work its way through the tubuli and effect the object. Different men have advocated widely different practices as to the time the application should be left in place, from a few hours to a number of days. He finds from two to four days to be necessary. He seals it with gutta-percha, and on approximal surfaces with wax. This is a perfect sealer of the cavity, and when it is not on a masticating surface is perhaps the best thing we have for the purpose.

Dr. H. H. Boswell uses arsenious acid with cocain. Instead of using carbolic acid, a practice which should be avoided, he moistens a small pledget of cotton with muriate of cocain, and on this puts his nerve-paste, and at least five times out of six there is no pain at all.

On motion, the subject was passed, and the convention adjourned till 3 P.M.

Afternoon Session.

Dr. Burkhart called the convention to order at 3.15 P.M. Dr. C. S. Butler read a paper on "Dentition a Cause of Disease," which will be found on page 1301 of this issue of the DENTAL COSMOS.

Discussion.

Dr. J. Edward Line. The paper just read goes over the subject in question very thoroughly indeed from the standpoint of the essayist, which is that favored by authority, eminent and otherwise, and, studied in the light of past teaching, meets all the requirements of what must be characterized from another standpoint as the wrong side of the case. Since teething of the civilized infant began, every ailment not known to be contagious has been charged up to a process purely physiological, as much so as the growing of hair and nails.

That this process is at times accompanied by more or less of discomfort during the gum-cutting stage is conceded, but that it is concerned even at this time in other than a reflex way cannot be admitted; while as to its relation as a well-defined cause of those alleged effects commonly known as diarrhœas, dysenteries, and cholera infantum, they are too remote to be rated as even possibly consistent with fact. Irritability, or nervousness as we are apt to term it in the adult, is a condition that frequently attaches to some men under circumstances out of the ordinary, and as invariably makes a more or less profound impression on some distant part,—the alimentary tract, for example. Not a few of those now present have at times experienced this unpleasantness as a result of worry incident to the preparation and presentation of a paper before some learned body, or even so simple a thing to some as the framing of a response to a toast at a dental dinner. Many a man has dropped his appetite at the bare announcement of the toastmaster's call. The prick of a pin at the hands of a four-year-old, just to hear the more recent arrival squeal, has all but driven the little automaton into convulsions, at the same time perverting the function of the alimentary tract throughout its whole extent. A fly on a man's nose will irritate beyond compare, and, if a busy one, raise his temperature to twice ninety-eight,—provided always you let the man himself tell it. All of these instances of irritability, nervous and other, are off the same piece with those credited to gum-cutting teeth—they are reflex, occur only on occasion, and deserve to rank with the merely incidental. This is conceded, tacitly at least, by the medical attendant, who *never* restricts himself to the signs supplied by the oral cavity, but inquires carefully into the condition of the bowels, the number and character of the passages. He may or he may not indulge in the now and then excellent practice of gum-lancing, but even then he rarely foregoes prescribing for parts of the alimentary canal remote from the oral cavity. The prescription may consist of directions as to the food-supply or of medicine, or both. While he may, as in the case of the eminent authors quoted by the essayist, credit the ailment in question, in part at least, to the growth and development of teeth, his effort at cure is in another direction, and it would be far from right to say that the intelligent and conscientious practitioner was more concerned in getting rid of effects than in the rooting out of cause.

It is matter of common knowledge that happenings are more or less rhythmic. There is rise and fall in the birth-rate, increase and decrease in mortality, certain diseases show a preference of one season of the year over another, more people become insane in midsummer than in midwinter, and, finally, more children are born in some months than in others. For present purposes, however, the birth-rate may be assumed as constant from month to month throughout the year, and the inference follows that as many babies are born in February as in August, and, as a further corollary, that just as many are engaged in growing, developing, and cutting teeth. This being the case, we would naturally look for as high a mortality from the so-called diseases of dentition in winter as in summer, or during the heated term. To this statement an obvious objection may be urged, but the heat of summer does not affect the infant within a number of degrees as it does the adult, and if it did, would be more than offset by the gen-

erally unsanitary condition of the average dwelling in winter. A high mortality does not obtain, nor an extended sick-list, and yet dentition is in progress all the time.

To what, then, should the majority of the so-called diseases of dentition be ascribed? Barring the possible exceptions mentioned a few moments ago, and which figure in this view of the matter as simply incidental, the answer is, Primarily to the quality of the food-supply, modified by quantity and the frequency with which it is exhibited. Other things being equal, that furnished by the mother is the food of foods, and with mothers who have had experience in these things it is matter for congratulation when circumstances enable them to tide their offspring over the heated term. But even in these cases care to the utmost must be exerted, for while the mother herself may attribute the disturbances in question to the cutting of teeth, and especially the "stomach teeth," they are rightly credited only when placed opposite her personal shortcoming or downright indiscretion. A glass of hard cider or dry wine, a sour apple, a tart prune, vinegar in the salad, a little lemon-juice on oysters or clams, and a night off and the advent of the family physician upon the scene are foregone conclusions. The food-supply has been contaminated, and the proof is even more apparent than the flavor of field turnip in winter-made gilt-edge butter.

But it so happens that with the well-to-do, as a necessity or as a convenience, and with the not-so-well-to-do as convenience almost wholly, the mother-fed infant has gone out of fashion, and to-day the bottle-fed baby is very much to the front. The food-supply in these cases is of necessity from an outside source, hence the first search is cow-ward. Even here, and as a further protection against the ever-threatening so-called diseases of dentition, the supply must come unmixed,—it must be the output of but one animal, and that as free from disease of whatever kind as the conditions of domestication will permit. It may be too rich in fats, in which case it rests on the infantile stomach as easily and as long as would a lump of butter on that of an adult. Water is added to reduce it in richness, a little salt to dissociate the fats, and still the diseases said to be caused by dentition, difficult or otherwise, persist. The infant foods of the laboratory may be substituted, with or without milk as an ingredient, and still there is no improvement. The mother and her lay advisers look for teeth, the medical attendant examines the stools. Undigested masses of food, signs of excessive acidity of the secretions or of the contents of the canal, suggest to him something radically wrong in the food or in its preparation. This wrong must be righted, and to that end thorough sterilization of the milk, the water with which it is reduced, or in which the laboratory product is dissolved or suspended, also of the bottle and its attachments, is prescribed; the quantity per feeding is determined, as also the frequency of its administration, and lo, the diseases so commonly referred to teething vanish so speedily that teeth and the incidents attending their eruption are all but forgotten. The conclusion, therefore, would seem to be that variations in the quality of the food-supply and the quantity and frequency of its exhibition are responsible, *except in incidental ways and cases*, for infantile irritability, fevers, convulsions, and diarrhœas, dysenteries, and the so-called cholera of early childhood. To state it a little differ-

ently, these well-pronounced disturbances are due to ill-feeding,—the exhibition of food physically or chemically unfit, whether tainted by articles of food or condiments eaten by the nursing mother, or contaminated in transit from an outside source through the by-products of micro-organisms, always most prolific and energetic during the heated term, when teething and the “diseases of dentition” are said to be at their best, notwithstanding teething, like the babies themselves, is a constantly recurring factor, and a matter of not summer, nor winter, nor monthly, but *daily* occurrence. In fact, it would not strain the imagination to any great extent to reverse the terms of cause and effect, and say that the diseases in question, instead of being caused by the growth, development, and eruption of teeth, were themselves active in contributing to the discomforts of the closing stages of dentition, commonly designated “gum-cutting ;” that dentition becomes other than normal largely by reason of ignorance or indifference on the part of all concerned as to the exact requirements of the vegetative function of feeding.

Dr. W. W. Smith spoke of a case which he recently had of a child, a little girl, of twenty months of age. The little one showed fever and diarrhœa, which the mother thought came from the teeth. A physician being called in, prescribed for the fever and for the diarrhœa. After two days the child became paralyzed in the left leg and suffered with an inactivity of the kidneys, for which niter was prescribed, with beneficial effect, which, however, lasted only two days. When Dr. Smith examined the case, he found none of the teeth had erupted, and reported the fact to the physician, who said he could not see any possible connection between that fact and the disease of the child. Another physician being called in, he thought the condition might be due to the teeth. Dr. Smith found a report of a case somewhat like it in the “American System of Dentistry,” and so requested the privilege of lancing the gums, which being granted, he made a deep incision over the cuspids on the right side. The second day afterward the child could stand on its foot, and the third day could walk, and now there is nothing apparently wrong, except a slight numbness in the foot.

Dr. P. K. Stoddard said he was convinced that the testimony of the millions of mothers who had raised children was correct, and that the diseases of dentition did exist. They are found not only among the ignorant people, but equally among the children of the most intelligent, and those who are most careful with the feeding and surroundings of their little ones.

Dr. F. W. Low related several cases where recovery from convulsions and other alarming conditions incident to infantile life followed immediately upon the lancing of the gums ; also told of a case of a lady, about twenty years old, who was wasting away till she was scarcely more than skin and bones, without any apparent disease. Upon examination of her mouth, it was found that the third molars were not erupted, and they were dug out. From the time of the operation she began to mend, and soon recovered health entirely.

He holds that these cases all prove that the troubles were caused by the irritation of dental tissue.

Dr. W. W. Smith related a case of a young lady who suffered with occipital neuralgia and also with trouble in her eyes. Upon ex-

amination, it was found that the third molar was not erupted, and that he would have to extract the second molar before it could erupt. This was done, and both the eye-trouble and the neuralgia disappeared.

Dr. Stoddard said whether infantile stomach-troubles with diarrhœa are really caused by the eruption of the teeth or not, his experience had shown him that lancing the gums would bring about a cure, and that it was much safer to lance the gums than to try to check the diarrhœa with medicine.

Dr. Butler, in closing the discussion, regretted that Dr. Line had not taken a broader view of the subject. The question of feeding infants is an important and serious question. The paper does not claim, nor does Dr. Butler hold, that all the diseases of children are due to teething. The question of the increased infantile mortality of summer over winter need not be discussed. It is due to diseases of the alimentary tract, of which the paper does not treat.

In adults it is much more easy to form a diagnosis than in infants, but we know that reflex neuroses cause many and serious troubles, which are frequently difficult to account for. He spoke of a lady who seemed to be going into a decline, and who feared she had an ulcer in her throat. She consulted a laryngologist, who found nothing the matter with her throat, but who discovered that her eyes were not properly balanced. Operative relief of this was had, with the result that the strain on the eyes being relieved, she rapidly regained health and strength. His own case was somewhat similar. Having long been subject to alimentary trouble, he discovered that his sight needed correction by means of lenses, which have very promptly and completely relieved the difficulty with the alimentary tract. So, as this irritation of the nerves of the eye causes such serious and various troubles to the rest of the system, we must believe that irritation of the nerves about the teeth by difficult or retarded eruption is responsible for the infantile troubles which so quickly answer to the operation of lancing the gums, and thus relieving the strain.

The secretary read an invitation from the Eighth District Society for the convention to meet next year at Buffalo. The invitation was accepted, and, on motion of Dr. C. T. Howard, an invitation was extended to the Fifth District Society to meet with them.

On motion, a resolution was passed thanking the committee of arrangements for the excellent accommodations and arrangements they had provided, and the convention adjourned to meet at the banquet in the same room at 8 P.M.

WOMAN'S DENTAL ASSOCIATION OF THE UNITED STATES.

THE regular monthly meeting of the Woman's Dental Association was held November 4, 1893, at 1602 Arch street, Philadelphia; President Mary H. Stilwell in the chair.

Dr. Mattie T. Haley read a paper, subject, "How may we be Successful with Children?" The next meeting will be held at 1300 Arch street, Philadelphia, December 2, 1893, at 7.30 P.M.

ELIZA YERKES, *Rec. Sec.*,

4004 Chestnut street, Philadelphia.

SAN FRANCISCO DENTAL ASSOCIATION.

At the regular monthly meeting of the San Francisco Dental Association, held in Mystic Hall, Union Square Building, San Francisco, Cal., October 9, 1893, the following officers were elected for the ensuing year: Dr. C. L. Goddard, president; Dr. C. E. Post, vice-president; Dr. F. C. Pague, recording secretary; Dr. G. N. Van Orden, corresponding secretary; Dr. W. A. Knowles, treasurer; Dr. C. E. Post, librarian.

FRANK C. PAGUE, *Rec. Sec.*

EDITORIAL.

THE TACTUS ERUDITUS.

MUCH stress by teachers of obstetrics and gynæcology is laid upon the development of the tactile sense as an invaluable aid to diagnosis in these departments of medical and surgical work. The value of an educated touch is fully recognized and very properly insisted upon, but the principles involved in its acquisition are rarely, if ever, sufficiently emphasized. The importance of this diagnostic aid to the physician is evident. He is constantly called upon to determine accurately by the sense of touch the relations of parts and organs which he cannot see. To a much greater extent the dentist is called upon to use the same faculty not only occasionally, but during every working hour of the day. There is perhaps no other calling in life which demands the delicacy of manipulation which is constantly necessary in dental practice, and the tactile sense of the dental operator becomes developed in the highest degree. It is of importance, therefore, that he should educate his sense of touch methodically and intelligently for the benefit and comfort of his patients, as well as his own. Dental practice will develop it *volens volens*, but the operator who has developed the "tactus eruditus" systematically until his manipulative ability makes his work not only a fine art but his treatment humane, has acquired an enormous advantage over his neighbor who disregards its importance.

The education of the touch implies the education of the brain in harmony therewith. It is simply the utilization of an important perceptive faculty in what may be termed an extraordinary manner. Normally we depend almost wholly upon the faculty of vision for our mental concepts of form and color. It is this sense in the normal man which is first called into service in obtaining a knowledge of objects, and in the majority of instances the mental inquiry is satisfied by the data furnished by vision; hence investigation proceeds no further, the other perceptive faculties of touch, smell, or hearing are not called into play, and the visual faculty is developed disproportionally to the others in relative acuteness. In the abnormal man we frequently find

the highest perceptive acuteness in connection with some one or more of the other faculties. Thus in the blind the sense of touch becomes developed out of all proportion to that seen in the normal individual. They read raised print, distinguish the value of coins, the nature of textile fabrics, with unerring accuracy, and instances are not wanting where a certain close relation between the color sense and tactile sensitiveness in the blind has been observed.

There is ample reason for the belief that in some of the lower animals the sense of sight is of secondary importance to that of smell. The dog, for example, depends for his knowledge of the location of game in most instances wholly upon the olfactory sense.

The development of the tactile sense in dental work, therefore, is simply a question of so educating the mind with reference to the touch that it shall correctly interpret the nervous impulses received through the tactile corpuscles, and with the same fullness and accuracy that it interprets those received through the eye. The touch of the dentist soon acquires sufficient delicacy to enable him to accurately determine the texture and quality of tissue upon which he is operating,—for example, to distinguish between enamel and dentine or carious and non-carious tooth-structure, or to detect with a delicate probe or broach the presence and character of pulp-tissue in a canal, or of carious bone or salivary calculus about the apex of a root. It is, however, possible to still further educate the touch so that it will satisfy the inquiry of the mind upon questions relating to form and magnitude. This higher development of the tactile sense gives an added acuteness in diagnosis which is invaluable, and may be acquired by persistent and intelligent practice. The introduction of systematic instruction in dental technics as a part of the curriculum of dental educational institutions is a most important aid in the development of this faculty. But while manual training in its restricted sense is one of the desirable features to be gained, it should be definitely and prominently borne in mind that manual dexterity is not the first desideratum of the system. It is essentially a cultivation of the mental organization through the medium of the perceptive faculties, and particularly through the tactile sense. So much of dental work is done upon the authority of the tactile sense unaided by vision, that the careful systematic training of the touch should receive a fuller recognition and education, both in our colleges and by practitioners.

“HORROR” OF THE OPERATION AS A FACTOR IN SHOCK.

MARCUS EUSTACE, M.D., etc., of the Mission Hospital, Quitta, Beloochistan, writing to the *British Medical Journal* of October 7, calls attention to the element of dread or “horror” of the opera-

tion by the patient as a dangerous factor, especially in connection with chloroform administration. He says, "I have seen shock produced by beginning the operation before the patient was quite under the influence of the anesthetic,—profound shock produced in the simplest way, and caused only by the fact that the patient was sufficiently conscious to be aware that the operation had commenced ; the horror, if I may say so, of the incision acting on the patient's heart, though pain may have been entirely absent. I have almost seen death from this cause. Now, this would not be death under chloroform, nor is it true shock, but due to carelessness on the part of the operator. As I read, day by day, of cases dying upon the table 'just as the operation was commenced,' it comes to my mind that the cause of death is not chloroform, but the lack thereof. Also, when using chloroform, I never like to begin sponging and lotionizing after the anesthetic has commenced to be administered, and before the patient is quite unconscious. May not the patient in his or her confused state of mind confound the dripping and sponging of the lotion with hemorrhage, and have the horror of the operation produced leading to shock and syncope? . . . I believe fewer deaths would take place under chloroform if the washing were done beforehand, and the surgeon could bide his time till the patient came absolutely under the influence of the anesthetic."

This strikes us as good, sound reasoning. Medical literature is full of instances where death has resulted from the dynamic effect of emotional impressions sufficiently intense to bring about cardiac failure. Daniel Hack Tuke, in his "Influence of Mind upon the Body," clearly explains at great length the causal relation of psychic shock to the fatal termination following it in certain cases. Moreover, the suggestion is in harmony with the known physiological action of chloroform. It has been repeatedly shown that fatalities in connection with chloroform anesthesia have mostly occurred where but slight amounts of the drug have been administered. It is this fact, and the nearly upright posture for tooth-extraction, which have given to chloroform its bad record in dental practice. While the same effects are not known to be produced in connection with the use of other anesthetic agents, it has not by any means been proven that they are absent, and if the element of shock in minor operations is to be eliminated as far as may be possible, the effect of the anesthetic should be pushed to the extent of producing complete unconsciousness. This is particularly needful in neurotic patients or those of weak heart.

Chloroform, alone or in any of its combinations with other anesthetics or hypnotics, should have no place in dental practice, nor can we see the necessity for its use in general surgery. We quite agree

with the writer quoted, that there would be fewer deaths from chloroform if the washing, etc., were done beforehand; but would there not be still fewer if ether were substituted for it as a general anesthetic? And is not the death-roll from chloroform sufficiently large to convince any but a fanatic that the continued use of this drug, whatever its legal status may be, is from the moral standpoint criminal malpractice?

CORRECTION.

SINCE the publication of our last issue we find that an error in the report of Dr. Andrews's paper on "Pre-historic Dentistry in Central America," read before the Pan-American Medical Congress, to which attention was called by Professor Chandler in the November COSMOS, did not, as we believed, occur in the author's manuscript, but was a clerical slip which occurred in transcribing our reporter's notes of that meeting, whereby the word "filled" was substituted for "filed." We gladly make the correction, with our apologies to the author of the paper.

BIBLIOGRAPHICAL.

DISEASES AND INJURIES OF THE TEETH, INCLUDING PATHOLOGY AND TREATMENT. A Manual of Practical Dentistry for Students and Practitioners. By MORTON SMALE, M.R.C.S., L.S.A., L.D.S., Dental Surgeon to St. Mary's Hospital, etc.; and J. F. COLYER, L.R.C.P., M.R.C.S., L.D.S., Assistant Dental Surgeon to Charing Cross Hospital, etc. London, Longmans, Green & Co.; and New York, 15 East Sixteenth street, 1893.

This work will, we believe, be an acceptable addition to our list of text-books. It covers a wide field fairly well, and is especially valuable because of its comprehensiveness and the conservative attitude which it maintains throughout in the treatment of pathological conditions, as well as in the description and choice of operative procedures. One is disappointed, in view of the character and authorship of the work, in finding so meager an account of pyorrhea, salivary calculus, and erosion. These subjects demand fuller presentation in our text-books, especially as recent periodical literature has produced material which has thrown additional light on these obscure disorders. We feel inclined to criticise the authors' attitude upon the subject of gum-lancing in cases of difficult dentition in children. They regard this simple operation as a *dernier ressort* to be employed, even when convulsive seizures supervene, only after systemic measures—for example, doses of sod. bicarb. and bismuth, or belladonna and hot-water enemas, Fellowes's or Squire's hypophosphites, etc.—have failed.

We are directed to use the lancet under the following circumstances : " Having satisfied ourselves that no other cause is likely to be producing the trouble, we should proceed to lance the gums over the tooth which would in the ordinary course of events be next erupted ; for although the tooth itself may not be the actual originator of the trouble, the letting of blood will have a beneficial effect." We would like to ask what possible objection there can be to dividing the gum over the presenting tooth or teeth first, and then having eliminated the probable immediate cause of difficulty, proceed to systemic medication for the cure of the nervous or intestinal derangements caused thereby ?

In the section devoted to orthodontia the writers condemn the use of "fixed apparatus" in regulating teeth, and then proceed to a description of some of the better forms of this class of appliances, explaining their advantages. Their condemnation needs qualification, for while certain kinds of fixtures of this class do exert a harmful influence upon the structure of the tooth, the same objection applies to removable regulating appliances if not carefully watched and cleansed, especially those of vulcanite, so largely used in England, which cover the hard palate and envelop the crowns of the teeth, sometimes including the buccal surface of the alveolar border. These can exert an injurious effect not only upon the hard structures, but upon the gingival structures as well, unless extreme care as to cleanliness is observed in their use.

Of implantation of teeth it is said, " The results obtained from implantation are not encouraging, and do not justify the operation." This we regard as a debatable question, even if not wholly untrue. It depends upon how and under what conditions the operation is done whether the results are or are not sufficiently encouraging to justify it.

In marked contrast to this is the approval given to the operation of immediate torsion for the correction of certain irregularities of the incisors,—an operation which should, once and for all time, be put under the ban as unsurgical, dentally speaking.

The criticisms here made are in no way intended to disparage the character of the work, which on the whole we regard as a valuable one. Its teachings are in general trustworthy. The chapter upon the treatment of caries is especially good, and with the exception of the points noted and a few of similar nature, which we hope will receive modification in future editions, we cordially commend the book to the dental profession.

LA REVISTA DENTAL AMERICANA is a new monthly periodical in the Spanish language, published in Philadelphia under the editorship of R. W. Edwards, D.D.S., with C. E. Edwards, D.D.S., as associate editor. Both of these gentlemen are fully qualified for the work

by their knowledge of dentistry and the dental requirements of the Spanish-speaking countries of South and Central America. The *Revista* is handsomely printed, and contains a goodly amount of interesting matter, well selected. It will, no doubt, be well received in its field.

A PRACTICAL TREATISE ON MECHANICAL DENTISTRY. By JOSEPH RICHARDSON, M.D., D.D.S., late Emeritus Professor of the Principles of Prosthetic Dentistry in the Indiana Dental College, formerly Professor of Mechanical Dentistry and Metallurgy in the Ohio College of Dental Surgery, etc. Sixth edition. Revised and edited by GEORGE W. WARREN, D.D.S., Chief of the Clinical Staff, Pennsylvania College of Dental Surgery, Philadelphia, etc. With six hundred illustrations. 8vo. Price, cloth, \$4.50; leather, \$5.50. Philadelphia, P. Blakiston, Son & Co., 1893.

The previous edition of this standard work was issued in September, 1888, since which date the department of dentistry devoted to mechanical and prosthetic-procedures has undergone such rapid development as to constitute a renaissance, if not almost a revolution. The immense possibilities which were found to be inherent in dental restoration by means of crown- and bridge-work not only developed new methods as related to this department, but added important details to our knowledge of the older procedures in plate-work. New methods for the application of heat in laboratory operations, a better understanding of the metallurgical features of the alloys used, their constituents and physical properties, have been a necessary outgrowth of the demand which has arisen for skill in the production of mechanical work of a high grade.

The older text-books in mechanical dentistry have become almost worthless as guides to the modern student, whose needs are in harmony with the advanced state of the art. A complete revision of the old standards became necessary. The present edition of Richardson is practically a new book. In all departments it has been carefully brought into accord with present needs, and is fully up to the latest thought in its field. The chapters upon fuels, the application and generation of heat, metals and alloys used in the work, impressions of the mouth, dies and counter-dies, etc., are full and satisfactory. The section upon crown- and bridge-work, embracing over two hundred pages, is a volume in itself. It is perhaps a cause for regret that some of the processes given for bridge-restorations were not omitted, for while they may be interesting and valuable from the standpoint of mechanical perfection, they are of doubtful value in point of utility. Reference is here made to the so-called pin-and-plate bridges for anchoring a dummy incisor crown to adjoining vital teeth. We take

exception also to the editor's theory of adhesion in explanation of the means by which full upper dentures are maintained *in situ*. His contention that it is simple molecular adhesion, independent of atmospheric pressure, we believe to be demonstrably wrong. These, however, are matters which in no sense mar the work as a whole, which, as it stands, is the best treatise on mechanical dentistry within our knowledge.

CHEMISTRY AND PHYSICS. By JOSEPH STRUTHERS, Ph.B., Columbia College School of Mines, N. Y., D. W. WARD, Ph.B., Columbia College School of Mines, N. Y., and CHARLES H. WILLMARTH, M.S., N. Y. (The Students' Quiz Series.) Philadelphia, Lea Brothers & Co., 1893. Price, \$1.00.

The authors state in regard to the present volume that their object has been to collect sufficient material on the sciences of chemistry and physics to cover the subjects as taught in a general collegiate or medical course. It is not intended to displace either text-book or lectures, but to be used as an aid by students entering upon the threshold of the sciences as an auxiliary to lectures, and by teachers in review work.

The value of a work of this kind depends mainly upon the judgment and care exercised in its compilation and condensation. To compress the essential features of the subjects under present consideration within the limits of two hundred and eighty small octavo pages is a task of extreme difficulty. The volume before us is a creditable attempt to accomplish this, and if used within the limits of its scope, as defined in the preface, will afford help and benefit even to those students who do not care to extend their studies in this field beyond the material which this small volume furnishes. Used in connection with other recognized sources of information, it will find a certain use with the more advanced student.

THE STUDENTS' DICTIONARY OF MEDICINE AND THE ALLIED SCIENCES. Comprising the Pronunciation, Derivation, and Full Explanation of Medical Terms, together with much collateral descriptive matter, numerous tables, etc. By ALEXANDER DUANE, M.D., Assistant Surgeon to the New York Ophthalmic and Aural Institute; Reviser of Medical Terms for Webster's International Dictionary. Square octavo, pp. 658. Price, cloth, \$4.25; half leather, \$4.50; full sheep, \$5.00. Philadelphia, Lea Brothers & Co., 1893.

To give anything approaching a comprehensive review of a medical dictionary is not possible, except after a continued practical use of it, or after much thorough and careful examination. This in the

present instance has not been possible. Such examination as we have been able to give it creates a most favorable impression. Its convenient form and size, and good press-work, are particularly acceptable in any work, but especially so in a dictionary which one has to consult frequently. Such definitions as we have examined are particularly full and explanatory. An important and valuable feature is the full system of derivation which is given in connection with the pronunciation, spelling, and definition of each term; this is too often imperfectly done in works of this character, and greatly limits their usefulness. The use of English letters instead of Greek in words derived from the latter is an advantage to those unfamiliar with that language. The book in its form, make-up, and matter is essentially a book for students, and one which undoubtedly well meets their requirements.

DENTAL METALLURGY. A Manual for the Use of Dental Students. By CHARLES J. ESSIG, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy in the Dental Department of the University of Pennsylvania. Third edition, revised. 12mo, pp. 272 and index. Price, \$1.75. Philadelphia, The S. S. White Dental Mfg. Co., 1893.

In the third edition of this standard work the author has adopted the system of spelling and pronunciation of chemical terms recommended by the Chemical Section of the American Association for the Advancement of Science, and adopted by the Association. The chapters upon amalgams, aluminum, and iron and steel have been amplified, and made to embody the improvements recently made in the production of those materials. The work is pre-eminently adapted to the needs of dental students, and includes only those subjects within its range which are needful for that purpose. Its matter is free from all unnecessary data, and is clearly and concisely presented. It is the best book in its field, and in its present form is fully up to date.

PAMPHLETS RECEIVED.

Fourth Annual Report of the Dental Association of Victoria. Presented to members at the Annual Meeting held in the Melbourne Athenæum, July 20, 1893, by Ernest Joske, Secretary.

Report of Twenty-fifth Annual Meeting and Silver Anniversary of the Third District Dental Society of New York, held at Albany, April 18, 1893.

PUBLISHER'S NOTICE.

FEATURES OF THE CLOSING VOLUME.

THE feature of the year's dental history was, of course, the holding of the World's Columbian Dental Congress,—the first international gathering of dentists as such. Equally of course the feature of the year's dental journalism was the work of the DENTAL COSMOS in connection with the Congress,—a chronicle of the proceedings on a scale unheard of for its fidelity and completeness.

Daily editions, some days running over a hundred pages, while the Congress lasted; a complete report of over four hundred pages, in the next issue of the regular edition after the close of the Congress. That is how the DENTAL COSMOS reported the Congress.

The Congress was an unusual event,—a probable turning-point in the history of dentistry, an epoch-marker. The DENTAL COSMOS made it possible for the dentists of the world to learn promptly of its doings. It is safe to say that through the work of the DENTAL COSMOS more dentists are to-day thoroughly posted upon the proceedings of the Congress than would ever have been possible without that work. For, not only have its own subscribers had the advantage of these reports, but many other dental journals, appreciating their value, have reproduced them in greater or less fullness, for the benefit of their readers. It has sown the seed broadcast. What will the harvest be?

But, while making the event of the year the feature of its work, the DENTAL COSMOS has not been unmindful of the smaller concerns of every-day practice. Its nearly fourteen hundred pages for the year teem with information upon almost every topic in the range of dentistry. Important papers have been presented in every issue. No vital fact concerning theory or practice but has a place in its pages. In short, it presents the subject of dentistry with a completeness and fullness not attempted elsewhere.

The advertising pages are not the least important feature, as showing the advances in appliances. On one of the pages of the current number we have grouped the new devices and novel improvements of the year,—many of them the suggestion or design of dentists.

Basing our expectations on the earnestness and value of our work for the advancement of dentistry, we naturally look forward to a large increase of our subscription list for 1894.

Subscriptions must begin with January or July. Price, \$2.50 a year; \$1 25 for six months. Postage free to United States, Canada, and Mexico; other U. P. U. countries, 50 cents additional.

THE S. S. WHITE DENTAL MFG. CO.

OBITUARY.

DR. CHARLES KINGSLEY.

ALL the profession will learn with regret that Dr. Charles Kingsley died in Paris on the 22d of October. He was ill during less than two weeks, suffering from pneumonia and congestion of the lungs. The crisis was supposed to have been passed in safety, when heart-failure suddenly supervened.

Dr. Kingsley was born December 3, 1841, at Pittsford, Vt. While preparing himself for college he earned the necessary fees by teaching, and finally while a student of the University of Rochester the civil war began, and he enlisted in the Union army in 1864, remaining until he was mustered out in 1865. In the same year he began the study of dentistry in the office of his brother, Dr. Norman W. Kingsley, and because of a natural aptitude rapidly became very skillful, both as an operator and in other branches of dental work. He was the assistant and associate of his brother for five years, and in December, 1871, formed a partnership with Dr. Crane in Paris. This partnership continued until it expired by limitation thirteen years later, since which time he has been in independent practice at No. 9 Rue Auber.

During his career abroad Dr. Kingsley acquired the distinction of being considered one of the most skillful American dentists practicing abroad, and rapidly obtained a very large and remunerative practice, his clientèle being of the most select order, including many of the nobility from various capitals of Europe, and the most distinguished Americans traveling abroad.

Among his brother-dentists he was held in highest esteem, and contributed as greatly as any toward maintaining the high character, dignity, and good name of American dentists in Europe. He was vice-president of the American Dental Society in Paris, of which Dr. Thomas W. Evans is president. He was a man of studious habits, refinement of manner, and culture; a master of his profession, and of sterling integrity. He married Miss Jessie Bradbrook in 1871, and she survives him. He also leaves two sons, the elder of whom is at Yale University, and the younger at school in England. His body was cremated at Père la Chaise, October 24.

R. OTTOLENGUI.

DR. IRA STARR.

DIED, in New York city, October 11, 1893, of hypertrophy and dilatation of the heart, DR. IRA STARR, in the seventy-fourth year of his age.

Dr. Starr's death occurred very suddenly, and was unexpected, as he had had no previous indication of heart-trouble. He retired apparently perfectly well and strong, but passed away during the night.

He was born at Providence, Saratoga county, N. Y., October 16, 1819. He commenced the study of dentistry in 1859, with his brother, Dr. Alfred Starr, and entered upon practice in 1862, at No. 432 Grand street, New York. He was an active and well-known member of the dental profession for over thirty years. He was for many years a member of the First District Dental Society.

Dr. Starr was twice married,—first, in 1846, to Miss Jane Hutton, of New York, who died in 1887, and by whom he had six children, the only two of them now living being Dr. Alfred R. Starr and one daughter. He was married a second time in 1888, to Miss Eleanor Fraser Thomas, who survives him.

DR. ISAAC M. CASE.

DIED, in Pomona, Cal., September 23, 1893, ISAAC M. CASE, D.D.S., in the thirty-seventh year of his age.

Dr. Case was born in Kenduskeag, Me. He was educated in the schools of his native town. Some specimens of his mechanical skill being noticed by a prominent dentist from New York, he was advised to study dentistry. Accordingly he matriculated at the Philadelphia Dental College in the fall of 1877, and graduated from it with honor in the spring of 1879. He opened an office in Bangor, Me., immediately after, soon winning a large practice there. In 1884, his health failing by reason of hemorrhages of the lungs, he went to Southern California for restoration. After two years he resumed his profession, and located in Pomona. During six years he had a flourishing practice there, after which hemorrhages returned, and he gradually failed till the time of his death. He was an active member of the Congregational church.

DR. HARVEY B. REINOHLE.

DIED, June 20, 1893, in the city of Washington, D. C., of pyæmia following tuberculosis, HARVEY B. REINOHLE, D.D.S.

Dr. Reinohl graduated from the Philadelphia Dental College in February, 1888, and after practicing in Mauch Chunk for two years and a half removed to Washington city, where he was in successful practice up to the time of his last illness.

Dr. Reinohl was skillful and conscientious in his work, and by his gentleness and kindness of heart had endeared himself not only to his patients, but to all with whom he came in contact. An injury sustained in boyhood had undermined his constitution, and rendered him an easier prey to a disease that he might have combatted for a longer time under more favorable circumstances.

DENTAL LEGISLATION.

DENTAL LAW OF CONNECTICUT.

Be it enacted by the Senate and House of Representatives of the State of Connecticut, in General Assembly convened :

SECTION 1. The governor shall appoint on or before the first day of July, 1893, and biennially thereafter, five persons to be known as dental commissioners, who shall hold their respective offices for two years from the first day of July in the year of their respective appointments, and until their successors shall have been appointed and qualified.

SEC. 2. No person shall be appointed a dental commissioner who shall not have been, for at least ten years previous to such appointment, a practitioner in dentistry in this state and in good standing in said profession.

SEC. 3. Said commissioners shall appoint one of their number to be their official recorder, whose duty it shall be to keep a record of the official proceedings of said commissioners, and copies of said record certified by him shall be legal evidence.

SEC. 4. On request of said commissioners the comptroller shall provide a suitable place in the capitol at Hartford for all meetings of said commissioners.

SEC. 5. Said commissioners shall meet in May of each year, and at such other times as they shall designate, for the purpose of attending to their duties as prescribed by this act.

SEC. 6. Said commissioners shall give due notice of every meeting to be

held by them pursuant to the provisions of this act, by advertising the place of their meetings, for two weeks successively, in two of the daily newspapers published in said Hartford, and before the date of said meetings.

SEC. 7. Said commissioners may make such rules of procedure for the regulation of all matters of application and hearing before them as they may think advisable.

SEC. 8. No person, unless he has already commenced the practice of dentistry in this state before the passage and approval of this act, and shall be engaged in said practice at the said time, shall engage in such practice in any town in this state, unless such person shall have first obtained from said commissioners a license therefor.

SEC. 9. All applications for such license shall be in writing and signed by the applicant, and no license shall issue to any person unless he shall have received a diploma or other sufficient certificate of honorable graduation from some reputable dental college having a department in dentistry, and duly recognized by the laws of the state or states wherein the same is situated, or unless he shall have spent as a pupil or assistant at least three years under the instruction and direction of some reputable dentist, or unless he shall have had at least three years' continuous practice as a dentist, which facts must be shown to said commissioners by sufficient evidence.

SEC. 10. Nothing in this act shall be construed as preventing any practicing physician or surgeon from the performance of any operation in dentistry on any patient under his charge. Nor shall any lawfully practicing dentist be prohibited hereby from availing himself of the services of any pupil, student, or assistant employed by him and under his immediate supervision.

SEC. 11. Every applicant for a license shall be examined by said commissioners, as to his professional knowledge and skill, before such license shall be granted, and they may refuse to grant a license where they are satisfied that the applicant is unfit or incompetent; they may for good and legal cause revoke any license that has been granted, and may prohibit any dentist in lawful practice from further practice, on satisfactory proof that such dentist has become unfit or incompetent therefor.

SEC. 12. Cruelty, incapacity, unskillfulness, gross negligence, indecent conduct toward patients, or any such professional misbehavior as shows unfitness on the part of the dentist, shall be sufficient cause for the revocation of a license, or prohibition to practice as above provided; and whenever complaint shall be made to any of said commissioners against any dentist practicing in this state, said commissioners shall investigate the matter, and on finding probable cause shall notify the party complained of to appear before them and show cause why he should not be prohibited, or why his license should not be revoked.

SEC. 13. Every such notice shall be in writing, and signed by the recorder, and shall contain a statement of the causes for which such prohibition or revocation is claimed, and shall specify the place and time for the hearing, which shall be at least twelve days after the service of said notice. Said notice may be served by leaving a copy thereof attested by the recorder, at the place of business of the party complained of or at his last usual place of abode, or by sending the same by mail.

SEC. 14. Any dentist who shall at any hearing before the commissioners, either by himself or by his procurement, make any false statement or misrepresentation with intent to deceive or mislead said commissioners, shall thereby forfeit his license, or be prohibited from practice.

SEC. 15. Any dentist who is aggrieved by the action of said commissioners in the revocation of his license, or prohibition from his practice, may apply to the superior court or court of common pleas, next to be in session in the county in which he resides, for a writ of mandamus, requiring them to revoke their decision, if the same be found on hearing to have been erroneous. Such application for mandamus may be served on said commissioners by some proper officer or indifferent person, by leaving with the recorder, or at his usual place of abode, a true and attested copy thereof within twelve days after said commissioners shall have notified such dentist of their decision.

SEC. 16. Every person applying for a license shall at the time of his application pay to the recorder a fee of twenty-five dollars, and if such applicant shall fail to obtain his license twenty dollars shall be returned to him.

SEC. 17. The recorder shall keep an account of all moneys received by him and shall annually in November render his account to the comptroller; and shall pay over from the moneys received by him the necessary traveling expenses of the commissioners, and for necessary books and stationery, and shall keep all files, receipts, and records in his possession, and deliver the same to his successors in office.

SEC. 18. Said commissioners shall make to the state board of health an annual report of their proceedings, in such form and at such time as such board of health shall prescribe.

SEC. 19. Any person who shall engage in the practice of dentistry in violation of the provisions of this act shall be guilty of a misdemeanor, and shall be fined not less than twenty dollars nor more than fifty dollars for each offense; and the unlawful practice of dentistry for one week or part of a week shall be deemed a separate offense.

SEC. 20. Sections 2024 and 2025 of the general statutes are hereby repealed

[The foregoing law went into effect on July 1, 1893, the following commissioners having been appointed under it by Governor Morris: James McManus, Hartford; William J. Rider, Danbury; Civilian Fones, Bridgeport; General Charles P. Graham, Middletown; and Richard W. Browne, New London.—Ed.]

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER, 1893.

- October 3.*—No. 506,098, to GEORGE A. BROUILLET. Rubber-dam clamp.
October 10.—No. 506,200, to GEORGE W. ARCHER. Dental chair.
 " " No. 506,350, to WILLIAM H. TOWNE. Dental disk-holder.
 " " No. 506,522, to DANIEL E. MORSE. Dental apparatus for grinding teeth.
October 17.—No. 506,742, to GEORGE B. SNOW. Gas-regulating apparatus for vulcanizers.
 " " No. 506,762, to ALFRED E. AHRENS. Process of securing dental suction valves to plates.
 " " R. I. 11,376, to JOHN S. CAMPBELL. Dental engine.
October 31.—No. 507,564, to GEORGE B. SNOW. Time mechanism for operating gas cocks.

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